VOL. XXXIII. PART 9 SEPTEMBER, 1954
(*Issued October, 1954*)

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REVIEW OF APPLIED MYCOLOGY

VOL. XXXIII SEPTEMBER 1954

HARMSEN (L.). **Merulius molluscus Fr., en sklerotiedannende Merulius-art.** [*Merulius molluscus* Fr., a sclerotia-forming *Merulius* species.]—*Blyttia*, 11, pp. 116–120, 5 figs., 1953. [English summary.]

Merulius molluscus [*R.A.M.*, 31, p. 154], reported on conifer wood on humid forest sites, is stated to be very rare in Denmark [see next abstract], where it has once been found on building timber. The author also encountered it in three localities of south-eastern Norway. On malt agar it produces an abundance of spherical or irregularly tuberous, brown, darker-spotted sclerotia, 5 to 6 mm. in length. In nature they are formed inside cracks or other hollows in the wood from which they take their frequently flattened shape.

HARMSEN (L.). **De danske Merulius-arter.** [The Danish species of *Merulius*.]—*Bot. Tidsskr.*, 50, 2, pp. 146–162, 20 figs., 1954. [English summary.]

This monograph comprises up-to-date information on and a key to the eight species of *Merulius* (plus a recent record of *M. serpens*) hitherto recognized in Denmark [*R.A.M.*, 8, p. 280]. *M. lacrymans* is common in houses but has not been found in nature, while *M. tignicola* [32, p. 652], also prevalent in buildings, has been observed once out-of-doors.

CZAJA (A. T.). **Intensiver Bautenschutz. Die schwammsichere Holzbalkendecke.** [Intensive protection of buildings. The fungus-protected wooden beam-ceiling.]—*Jb. tech. Hochsch. Aachen*, 4, pp. 136–148, 1951. [Received February, 1954.]

This is an amplified version of the author's proposals for the control of dry rot caused by *Merulius lacrymans*, *Coniophora cerebella* [*C. puteana*], *Polyporus vaporarius* [*Poria vaporaria*], *Lenzites* spp., and other fungi in German buildings by improved architectural methods, a note on which from another source has already appeared [*R.A.M.*, 33, p. 329].

GRAM (K.) & JØRGENSEN (E.). **An easy, rapid and efficient method of counter-staining plant tissues and hyphae in wood-sections by means of fast green or light green and safranin.**—*Friesia*, 4, 4–5, pp. 262–266, 1 diag., 1953.

A full description is given of an improved method for the counter-staining of hyphae and tissues in wood sections [*R.A.M.*, 25, p. 239; 26, p. 555] by the combined (instead of separate) use of fast or light green and safranin (*Bot. Tidsskr.*, 43, pp. 510–511, 1936; *Stain Tech.*, 11, pp. 69–70, 1936). In brief, the procedure involves three or more minutes' staining in a solution of 0·1 per cent. fast green and 0·3 per cent. safranin in 60 per cent. alcohol and mounting in balsam or euparal. The technique has been successfully applied at the Royal Veterinary and Agricultural

College, Copenhagen, to 14 species of fungi (mostly basidiomycetes) and 13 kinds of wood.

Shimazono (H.) & Takubo (K.). **The biochemistry of wood-decaying fungi. I. The Bavendamm reaction and the accumulation of oxalic acid by wood-decaying fungi.**—*Bull. For. exp. Sta., Tokyo*, 53, pp. 117–126, 1952. [Abs. in *Chem. Abstr.*, 47, 16, p. 8182, 1953.]

At the Forest Experiment Station, Tokyo, Japan, [unspecified] brown rot fungi [*R.A.M.*, 32, p. 598] reacting negatively to Bavendamm's test were shown to accumulate free oxalic acid in an acid medium, whereas most of the positively reacting white rot species are unable to do so [cf. 31, p. 413]. A new enzyme decomposing oxalic acid was separated from species of the latter group.

Savory (J. G.). **Surface mould on Obeche.**—*Timb. Technol.*, 61, 2164, pp. 81–82, 2 figs., 1953.

The sapwood of obeche (*Triplochiton scleroxylon*) is very liable to attack by surface moulds, chiefly *Cladosporium herbarum* [*R.A.M.*, 26, p. 322] and *Penicillium* sp. [cf. 30, p. 89; 33, pp. 392, 393], and even seasoned timber when this is exposed to relative humidities of 90 per cent. or over, as in newly built houses. These attacks, which leave surface stains, are most effectively prevented by brushing or spraying the wood with a 2 per cent. solution of sodium pentachlorophenate [see next abstract]. The disfigured timber may be prepared for staining or varnishing by sanding the surface or bleaching with a solution of sodium hypochlorite (10 per cent. by weight available chlorine).

Pauli (N.). **Bekjempelse av blåning på Furumaterialer.** [Control of blue stain on constructional Pine wood.]—*Norsk Skogindustri*, 7, 8, p. 270, 1953.

Directions are given for the control of blue stain [of unspecified origin] in constructional pine wood [*R.A.M.*, 33, p. 458] in Norwegian sawmills. Superficial protection may be conferred by 1·5 per cent. basilite PN (sodium pentachlorophenate)[s] [loc. cit. and preceding abstract], either as a spray at the rate of 10 to 20 l. dilute solution per cu. m. (for 1-in. boards) or as a dip, which requires a slightly larger quantity. For deeper penetration, however, chlorinated hydrocarbons should be used in combination with a linseed oil priming paint.

Zubieta (C. G.), Gomez (C. E.), & Bernardi (A. E.). **Valoración tóxica comparativa de algunos preservadores de madera.** [Comparative toxic evaluation of some wood preservatives.]—*Industr. y Quím.*, 15, 2–3, pp. 54–56; 4, pp. 106–111, 3 figs., 1953.

Full particulars are given of the methods and results of experiments performed at the Laboratories of the Technical Direction of Railways and Telecommunications, Buenos Aires, Argentina, to determine the relative toxicity to *Polystictus sanguineus* [*R.A.M.*, 30, p. 397; 33, pp. 392, 458] of various wood preservatives, using the Leutritz procedure [loc. cit.]. The most effective protection was conferred by creosote, to which an average rating of 93 per cent. was assigned, compared with 92 and 81 per cent., respectively for tanalith [32, p. 1] and wolmanite [basilite] UA [32, p. 654].

Kelsheimer (E. G.), Walter (J. M.), & Beckenbach (J. R.). **Compatibility of insecticides, fungicides and nutrients for vegetable crops.**—*Circ. Fla agric. Exp. Sta.* S-47, 6 pp., 1952. [Received December, 1953.]

As the result of compatibility studies since 1946 at the Gulf Coast Experiment Station, Bradenton, Florida, a list is given of 20 specific combinations, each of three

or more spray chemicals (fungicides, insecticides, and minor elements), under the various crops on which they have been found satisfactory, namely, pole bean [*Phaseolus vulgaris*], cucumber, squash, tomato, and [chilli] pepper. The compatibility or otherwise of all the materials studied to date, in mixtures of two components, is summarized in a chart [cf. *R.A.M.*, 32, p. 137].

Blumer (S.) & Harder (A.). **Über die Beizung von Gemüsesamen.** [On disinfection of vegetable seeds.]—*Landw. Jb. Schweiz*, 67 (N.F. 2), 3, pp. 315–335, 3 figs., 1953. [French summary.]

A tabulated survey is given of the results of greenhouse and field tests at the Wädenswil Experiment Station, Zürich, Switzerland, to determine the efficacy of eight fungicidal dusts in the control of seed-borne pathogens of beans [*Phaseolus vulgaris*], peas, spinach, and carrots. *Rhizoctonia* [*Corticium*] *solani* was effectively combated in the greenhouse by spergon, phygon, and fernasan (thiram) *R.A.M.*, 31, p. 247]. In the field the beneficial effects of these three protectants were most noticeable in early-sown peas, the germination of which is liable to be delayed by unfavourable weather. In a number of cases spinach and beans also responded to treatments (especially by phygon and thiram) by increased yields, but carrots were not influenced.

Eddins (A. H.). **Diseases, deficiencies and injuries of Cabbage and other crucifers in Florida.**—*Bull. Fla agric. Exp. Sta.* 492, 63 pp., 34 figs., 1952. [Received December, 1953.]

Details are given of the symptoms and control of the major and minor diseases of crucifers in Florida [*R.A.M.*, 32, p. 656 and above, p. 469], including those caused by fungi, bacteria, and viruses, and nutritional and physiological disorders.

Bremer (H.). **Kohlhernie. Ein Sammelreferat.** [Club root of Cabbage. A compilation.]—*Z. PflKrankh.*, 61, 1, pp. 4–8, 1954.

Although club root of cabbage (*Plasmodiophora brassicae*) has been known for so long and received such intensive study, many features of the disease still require elucidation. The author reviews briefly important work of recent years which greatly alters previous concepts of the disease and its agent. Most of the 42 papers listed in the bibliography have been noticed from time to time in this *Review*.

Pound (G. S.) & Weathers (L. G.). **The relation of host nutrition to multiplication of Turnip virus 1 in Nicotiana glutinosa and N. multivalvis.**—*Phytopathology*, 43, 12, pp. 669–674, 1 graph, 1953.

At the Department of Plant Pathology, University of Wisconsin, an investigation was made of the influence of major elements and balanced solutions on plant growth and the multiplication of the cabbage A strain of turnip virus 1 [turnip mosaic virus] from cabbage in *Nicotiana glutinosa* and *N. multivalvis* [*R.A.M.*, 33, p. 398]. In the nitrogen series, with and without potassium, virus activity of expressed sap, as determined by local lesions on inoculated half leaves of Connecticut Havana No. 38 tobacco, was directly correlated with plant growth, the levels (up to 630 p.p.m.) that increased host development acting similarly on virus concentration and conversely. Variations in the potassium supply alone did not noticeably affect either host growth or virus activity. The growth of both *N.* spp. was likewise increased by phosphorus at concentrations of up to 237 p.p.m., beyond which there was a decline. Virus activity corresponded closely to the amount of phosphorus supplied to the hosts. Virus multiplication was increased at a level of 547 p.p.m., which caused stunting. In balanced solutions maximum growth occurred at nitrogen, phosphorus, and potassium concentrations of 210,

31, and 235 p.p.m., respectively; there was marked stunting at higher levels. In general, there was a positive correlation between host growth and virus concentration.

Borges (M[aria] De L. V.) & Beato (M. Júlia). **Determinações de azoto em Brassica chinensis L. infectada com virus do mosaico amarelo do Nabo.** [Determinations of nitrogen in *Brassica chinensis* L. infected with Turnip yellow mosaic virus.]—*Brotéria*, 22 (49), 4, pp. 149–154, 1953. [English summary.]

Determinations by the micro-Kjeldahl method of the nitrogen content of healthy *Brassica chinensis* leaves in comparison with samples infected with turnip yellow mosaic virus [*R.A.M.*, 33, p. 128] at the National Agronomy Station, Portugal, showed that there was a variable increase in both total and soluble nitrogen in the diseased, calculated either on a fresh or a dry weight basis.

Ernould (L.). **Lutte contre la jaunisse de la Betterave. Étude de l'action d'insecticides 'systémiques' en champs d'essais, au cours des années 1951 et 1952.** [Campaign against Beet yellows. Study of the action of 'systemic' insecticides in experimental fields during the years 1951 and 1952.]—*Publ. Inst. belge Amélior. Better.*, 21, 2, pp. 41–65, 1953. [Flemish and English summaries.]

In field trials in Belgium during 1950 with systemic insecticides for the control of the aphid vectors of beet yellows virus, *Myzus persicae* and *Aphis fabae*, an increase of 930 kg. manufactured sugar per ha. followed two applications of pestox 3 [*R.A.M.*, 31, p. 159; 33, p. 407] or schradan at a concentration of 7·5 kg. and a rate of 1,000 l. liquid per ha., the corresponding increase of sugar for three treatments being 1,300 kg. In 1951 the increase following three applications of systox at 0·5 or 1 kg. per ha. was only 440 kg. per ha., and similar results were given by pestox 3. In 1952, when aphid infestation was very heavy, the yield increases secured with systox ranged from 13 to 37 per cent.

It is recommended that, in practice, systox should be applied two or three times at 12- to 14-day intervals at a rate of 0·5 kg. per ha., the initial treatment to coincide with the first appearance of the aphids.

Thornberry (H. H.) & Takeshita (R. M.). **Sugarbeet curly-top virus and curly-top disease in Illinois and their relation to Horseradish brittle root.**—*Plant Dis. Reptr*, 38, 1, pp. 3–5, 1954. [Multilithed.]

In 1953 the presence of beet curly top virus [C.M.I. map No. 24] was established in leafhoppers (*Circulifer tenellus*) [*Eutettix tenella*: *R.A.M.*, 33, pp. 332, 460] collected from horse-radish in Madison county, Illinois, and in diseased sugar beet plants from Cook county. A distinct connexion was observed between leafhopper population and prevalence of the horse-radish brittle root disease [20, p. 79], which reduced the crop by 80 per cent. in the East St. Louis area; the vector was found wherever infection occurred, but no causal relationship was established. Further studies are in progress to determine whether curly top virus is partly or entirely responsible for the disease.

Koch (F.). **Beitrag zur Frage der Beizung des Rübensaatgutes gegen die Blattfleckenkrankheit (Cercospora beticola Sacc.).** [Contribution to the question of Beet seed disinfection against the leaf spot disease (*Cercospora beticola* Sacc.).]—*Z. PflKrankh.*, 60, 7, pp. 337–348, 1953. [English summary.]

Sugar beet seed samples examined during the winter of 1950–1 at the Plant Protection Institute, Stuttgart-Hohenheim, Germany, bore external infection by conidia and internal by mycelium of *Cercospora beticola* [*R.A.M.*, 33, p. 205] and

also extensive contamination by *Alternaria* ? *tenuis*. The best control of both fungi in sand-box tests was obtained by dusting with albertan 44 (600 gm. per doppelzentner [100 kg.: 33, p. 7]), while ceresan-neu and tritisan at the same rate were effective only against *C. beticola*. *A.* ? *tenuis* was also more refractory to liquid treatments than *C. beticola*, being eliminated only by ceresan U 564 and albertan 44 (both at 0·1 per cent.) after five days in moist sand, whereas *C. beticola* was killed in 24 hours by ceresan U 564, formalin, and albertan 44 (except for one spore).

Three field experiments were also carried out, one at Hohenheim in 1951, when leaf spot was of moderate intensity, and two in lower Bavaria in 1952, where infection was mild in one place and severe in the other. Leaf spot developed later and in a less acute form in the treated than in the untreated plots. In the moderately infected area the treatments resulted in higher yields of foliage, and where the disease was severe beet production was substantially increased, especially by dynamal [loc. cit.] with a rise of 13·1 per cent., followed by aagrano 50 (11·3), albertan 44, and VP 1159 (both 10·9), all at 800 gm. per 100 kg.

Virtanen (A. I.). **The use of seeds with low content of trace elements in studies on essentiality of micro-nutrients.**—*Plant Physiol.*, 28, 2, pp. 323–324, 1953. [Received June, 1954].

The author reviews evidence that in order to demonstrate the effect of micronutrient deficiency in experimental plants it is necessary first to produce seeds low in trace elements [*R.A.M.*, 33, p. 156]. At the Biochemical Institute, Helsinki, Finland, tests with peas revealed that the seeds contained mineral substances which allowed relatively good plant growth even in nutrient solutions deficient in the necessary trace elements (*Planta*, 31, pp. 263–264, 1940).

Singh (R. S.). **Wilt of Lobia in Uttar Pradesh.**—*Sci. & Cult.*, 19, 9, pp. 454–456, 1954.

During August, 1948, some cowpea plants intersown with guar (*Cyamopsis psoraloides* [*C. tetragonoloba*]) at the Agricultural School, Buland Shahr, India, were observed to be suffering from a wilt disease. In 1953 a new early-maturing variety, Lobia Type 1, was planted by the Department of Agriculture, Uttar Pradesh, and found to be very susceptible to the disease, particularly April-sown crops. Epidemics have been reported from many parts of the Province. Isolations from diseased material collected in 1948 and 1953 yielded cultures of a *Fusarium* of the *elegans* group, *Rhizoctonia* [*Corticium*] *solani*, and *Neocosmospora vasinfecta*. The two first-named were pathogenic to cowpea and guar [cf. *R.A.M.*, 31, p. 386].

Quantz (L.). **Über das Verhalten von Buschbohnensorten gegenüber den Bohnenmosaikviren 1 and 2.** [On the reaction of Dwarf Bean varieties to the Bean mosaic viruses 1 and 2.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 9, pp. 129–132, 2 figs., 1953.

In trials at the Virus Research Institute, Celle, Western Germany, the reactions of dwarf bean (*Phaseolus vulgaris*) varieties to bean mosaic and bean yellow mosaic viruses were evaluated in the field and in the greenhouse, respectively [*R.A.M.*, 33, p. 8]. The selections Stringless Furore, Idaho Refugee, and Wisconsin Refugee were not attacked by bean mosaic virus and only slight infection developed on a number of other green-podded and wax varieties, the former including Terras Kora, Sultan, Schreibers Granda, Lange, Grandimuna, Imuna, Brech, Paas Lintorfer Frühe (Stringless), Breustedts Zeta, and Erfurter Speck, and the latter Schreibers Wachs Saxagold, Frühe Wachs, Wachs Helia, Bitterhoffs Wachs Füllhorn, Breustedts Wachs Gemma, Terras Wachs Goldquelle, Wachs Rhineland, Haubners frühe dickfleischige Wachs, Wachs Beste von Allen, and Wachs Goldhorn.

The moderately infected group was represented, e.g., by the green-podded Herkules, Riesen Flageolet Mammuth, Gebr. Dippes Stringless Herold, and Stringless Saxa, and the wax Hinrichs Riesen, Superba, Zucker Perl, and Mont d'Or (the three last-named stringless).

The least susceptible to yellow mosaic included Riesen Flageolet Mammuth, Paas Lintorfer Frühe, Erfurter Speck, Schreibers Imuna, Burpees Stringless Green Pod, Schreibers Wachs Saxagold, and Wachs Superba. Comparatively mild symptoms were displayed by Gebr. Dippes Herold, Herkules, Idaho Refugee, Wisconsin Refugee, Stringless Green Pod, Wachs Zucker Perl, Superba, Mont d'Or, and a number of others.

Bazán De Segura (Consuelo). **'El hielo amarillo' enfermedad bacteriana de Frijol en el Perú.** ['Yellow blight' bacterial disease of Bean in Peru.]—*Bol. Estac. exp. agríc. La Molina* 50, 15 pp., 21 figs., 1953. [English summary. Mimeographed.]

Halo blight of bean [*Phaseolus vulgaris*], caused by *Pseudomonas medicaginis* var. [f.sp.] *phaseolicola*, was reported for the first time from Peru [C.M.I. map No. 85], causing heavy damage on a farm in the Carabayllo Valley, where the harvest was reduced to 20 or 30 per cent. of the normal. Other districts affected were the Chincha and Huaral Valleys, Pativilca, and Huacho. Among the countries stated by the author to harbour the pathogen are Brazil and Norway. It was isolated from diseased petioles, leaves, pods, and seeds, and its pathogenicity demonstrated by inoculation tests on the Red Kidney and Paramito varieties, of which the former was the more susceptible.

Gante (T.). **Verticilliose an Sojabohnen.** [Verticilliosis of Soy-Beans.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 6, 3, p. 38, 1954.

During a protracted drought in the summer of 1952, soy-beans at a branch of the Max Planck Institute for Breeding Research at Ladenburg on the Neckar, Germany, developed a tracheomycosis which spread extensively with the onset of a wet spell. *Verticillium albo-atrum* was isolated from infected stem bases, this being apparently the first record of its occurrence on soy-bean in the country. According to N. O. Frandsen, the fungus was also present in stunted lupins in another part of the same field.

Bruder (J.). **The results of hot air treatment of Onion sets.**—*Kertész. és Szőlész.*, 2, pp. 15–16, 1953. [Abs. in *Hung. agric. Rev.*, 2, 2, p. 7, 1953.]

Following hot air treatment (35° to 40° C. for 15 to 30 days according to size) of onion sets to prevent bolting in Hungary in 1952, *Fusarium* infection did not occur.

Pätzold (C.). **Krankheiten und Schädlinge der Topinambur.** [Diseases and pests of the Jerusalem Artichoke.]—*Pflanzenschutz*, 5, 11, pp. 139–143, 5 figs., 1953.

The only pathogen of Jerusalem artichoke [*Helianthus tuberosus*] causing serious damage to the crop in Germany is *Sclerotinia sclerotiorum* [cf. *R.A.M.*, 15, p. 421], which caused heavy losses in the Völkenrode district of Brunswick in 1950 and 1951. Isolated cases of infection were also observed in Lower Saxony and Baden from 1951 to 1953, inclusive. Control may be effected by appropriate cultural measures, including wide spacing, sparing application of nitrogenous fertilizers, late planting, and use of tall as opposed to bushy varieties. The tubers should be stored out-of-doors in sand. Those of oblong shape appear to be more susceptible than round ones. Besides *S. sclerotiorum*, *Botrytis cinerea* sometimes attacks tubers stored under unsuitable conditions.

Two forms of chlorosis are briefly described, one developing immediately after emergence and the other from mid-May onwards, while various leaf abnormalities, including a ring spot, are suggestive of virus infection [cf. loc. cit.].

Arx (J. A. v.). **De waardplantenreeks van Phomopsis dauci.** [The host plant range of *Phomopsis dauci*.]—*Tijdschr. PlZiekt.*, 60, 1, pp. 72–73, 1954. [German summary.]

The results of inoculation experiments on a number of Umbelliferae at the 'Willie Commelin Scholten' Laboratory, Baarn, Holland, showed *Phomopsis dauci* [*R.A.M.*, 31, p. 163] to be strictly specialized on carrot. Both cultivated and wild carrots are attacked by the fungus, which readily passes from one to the other.

Leyendecker (P. J.). **Effect of fungicides and spraying schedules upon internal mold of Chilli.**—*Plant Dis. Reptr*, 38, 1, pp. 32–34, 1 fig., 1954. [Multilithed.]

The sun-dried chilli industry in New Mexico is seriously threatened by the fact that internal mould develops in large numbers of fruits after reaching the market, 80 to 90 per cent. of the damage being caused by species of *Alternaria*, *Fusarium*, and *Hormodendrum*, developing mainly after the first killing frost in the field. In field trials at the Agricultural Experiment Station, State College, phygon XL (1 lb. per 100 gals.) applied once the day after the first severe frost gave the best control on fruiting College No. 6 chilli, followed by zerlate, dithane (both at 1½ lb.), and copper-hydro (6 lb.). Although internal mould was not entirely eliminated, the extent of internal and external fungal contamination of the pods was decreased appreciably.

Grogan (R. G.), Bardin (R.), & Schnathorst (W. C.). **Field occurrence of an unusual virus disease of head Lettuce.**—*Plant Dis. Reptr*, 38, 3, pp. 150–151, 2 figs., 1954. [Multilithed.]

A previously unreported virus disease was observed in October, 1953, on field-grown Great Lakes lettuce in the Salinas Valley, near Greenfield, California. Symptoms, mainly on the older and intermediate leaves, ranged from a diffuse yellow mottle with yellow ring spots to a brilliant yellow or white calico pattern, some of the leaves later dying; most infected plants were severely stunted. In inoculation experiments the symptoms produced on various hosts resembled closely those of tobacco ring spot virus [*R.A.M.*, 8, p. 139].

Gibson (I. A. S.). **Crown rot, a seedling disease of Groundnuts caused by Aspergillus niger II. An anomalous effect of organo-mercurial seed dressings.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 324–334, 1953.

Field experiments in Tanganyika demonstrated that whereas seed dressings with thiram preparations reduced incidence of crown rot (*Aspergillus niger*) in groundnut seedlings [*R.A.M.*, 33, p. 334], organo-mercurials generally produced a substantial increase. Thus, incidence per 1,000 plants at Urambo in 1949–50 ranged from 10·8 to 51·4 for four organo-mercurial preparations, compared with 7·5 for thiram A (1·5 oz. per cwt.), 6·3 for thiram B (1·5), and 15·3 for the untreated, the corresponding figures at Kongwa being 25·2 to 46·6 as against 18·4, 5·9, and 32·2.

This effect of the organo-mercurials is probably due to their selectively toxic action upon the fungus flora of the soil in the region of the treated seed operating to the advantage of *A. niger*, certain strains of which were far more tolerant of these compounds than other fungi in Urambo soil. Tolerant species of *Penicillium* were occasionally encountered. Mercury tolerant strains of *A. niger*, isolated from Urambo soil, were distinguished from sensitive strains both by a greater and more

rapid development of acidity in the culture medium and by their greater virulence when inoculated to groundnut seedlings.

HARRIS (H. C.). **Effect of minor elements, particularly copper, on Peanuts.**—*Bull. Fla agric. Exp. Sta.* 494, 20 pp., 3 figs., 1952. [Received December, 1953.]

Field experiments were conducted on Arredondo loamy fine sand at the Agricultural Experiment Station farm, Gainesville, Florida, to determine primarily the possible effect of copper treatments on the yield and quality of Dixie Runner, G.F.A. Spanish, and Alabama Runner groundnuts.

Each variety grown without copper showed abnormal leaf characteristics. In the bud area the leaflets sometimes died; many were small and irregular with dead margins. There was a mild chlorosis of the upper leaves and a few small, yellowish-white spots developed, the Spanish variety exhibiting a more pronounced interveinal chlorosis. Applications of 10 lb. copper chloride per acre with the fertilizer corrected these symptoms, increased the yields of the above varieties by 600, 531, and 325 per cent., respectively, and reduced the proportion of shrivelled nuts. Copper applied three years previously to an earlier crop more than doubled the groundnut yields of the subsequent crop. The amount required is very small; a spray would probably suffice to prevent deficiency. Flowers of sulphur applied alone also increased yields, probably by increasing the availability of the copper in the soil.

LIBBY (R. R.) & ELLIS (D. E.). **Transmission of Colletotrichum lagenarium by the spotted Cucumber beetle.**—*Plant Dis. Reptr*, 38, 3, p. 200, 1954. [Multilithed.]

The results of greenhouse experiments at North Carolina Agricultural Experiment Station, Raleigh, in 1952 indicated that cucumber anthracnose (*Colletotrichum lagenarium*) [*R.A.M.*, 32, pp. 59, 465] is transmitted by the spotted cucumber beetle (*Diabrotica undecimpunctata howardi*) [cf. 31, p. 272].

CROSSAN (D. F.), HAASIS (F. A.), & ELLIS (D. E.). **Phytophthora blight of Summer Squash in North Carolina.**—Abs. in *Phytopathology*, 43, 9, p. 469, 1953.

A destructive leaf and stem blight of summer squash (*Cucurbita pepo* var. *condensa*) has occurred sporadically in the Coastal Plain and Piedmont areas of North Carolina since 1948. The symptoms include a soft, watery breakdown of the leaf blades and petioles, while invasion of the stem results in rapid wilting and death of the plant. The fruits also are involved. The disease is rife under warm, humid conditions and has completely destroyed some plantings. *Phytophthora* ? *capsici* was isolated repeatedly from infected squash plants [*R.A.M.*, 24, p. 399] and its etiological relationship established by inoculations. The fungus was also highly pathogenic to [chilli] pepper (*Capsicum annuum*) on which it induced typical symptoms [31, p. 274 *et passim*]. Positive results followed the application of zoospore suspensions to the leaf axils, leaf blades, and petioles of 30-day-old Early Prolific Straightneck squash or the addition of the fungus to the soil in which healthy plants were growing.

ARK (P. A.). **Angular leaf spot of Squash.**—*Plant Dis. Reptr*, 38, 3, pp. 201–203, 2 figs., 1954. [Multilithed.]

Pseudomonas lacrymans [*R.A.M.*, 32, p. 617] was recorded for the first time on field-grown Black Zucchini squash near San Francisco, California, causing brown, necrotic leaf spots, each with a conspicuous yellow halo, and watersoaking of the dorsal spongy mesophyll of affected leaves. In the greenhouse, banana squash, cucumber, watermelon, honeydew melon, and muskmelon were successfully

inoculated with the squash isolate, while isolates from cucumbers produced typical lesions on squash.

Parris (G. K.). **Diseases of Watermelons.**—*Bull. Fla agric. Exp. Sta.* 491, 48 pp., 32 figs., 1952. [Received December, 1953.]

This is a revision of *Bulletin* 459 [*R.A.M.*, 29, p. 74] describing the symptoms and control of the principal diseases attacking watermelons in Florida.

Stalder (L.). **Witterung und Traubenfäulnis.** [Weather and Grape rot.]—*Schweiz. Z. Obst- u. Weinb.*, 62, 25, pp. 477–484, 1 fig., 1 graph, 1953.

Further evidence is presented from the Wädenswil Experiment Station, Zürich, Switzerland, indicating the importance of heavy rains in the promotion of grey mould (*Botrytis cinerea*) on vines, especially the highly susceptible Riesling× Sylvaner variety [*R.A.M.*, 33, p. 465].

De Bruin-Brink (G.), Geesteranus (H. P. M.), & Noordam (D.). **Lycopersicum-virus 3 (Tomato spotted wilt virus), oorzaak van een ziekte bij Nicotiana tabacum en Impatiens holstii.** [*Lycopersicum* virus 3 (Tomato spotted wilt virus), the cause of a disease of *Nicotiana tabacum* and *Impatiens holstii*.]—*Tijdschr. PlZiekt.*, 59, 6, pp. 240–244, 2 pl., 1953. [English summary.]

The symptoms of natural infection by tomato spotted wilt virus observed on young tobacco plants in frames at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, Holland, in 1943 corresponded closely to those described by Moore for kromnek in South Africa [*R.A.M.*, 13, p. 129], and by workers elsewhere. The symptoms resulting from inoculation of tobacco plants with sap from infected *Hippeastrum hybridum* and *Impatiens holstii* [32, p. 559] and those occurring naturally on *I. holstii* and *I. sultani* are fully described. The infected *Impatiens* plants were growing near *Campanula isophylla* [30, p. 416], from which the virus was doubtless carried by thrips.

Szirmai (J.). **Palánták gyökérvirusának változata.** [A mutant virus on plant roots.]—*Agrártud. egy.*, 4, pp. 259–270, 1952. [Abs. in *Z. PflKrankh.*, 61, 1, pp. 23–24, 1954.]

In 1950 a virus was observed to be causing damage, often in association with *Thielavia* [*Thielaviopsis*] *basicola*, to the root systems of tobacco, tomato, chilli, thorn apple [*Datura* sp.], pelargonium, primula, and other plants in Hungarian market-gardens. At low temperatures and in poor light necrotic lesions also developed on the basal leaves, which sometimes withered in consequence. Three phases of the disease were distinguished, latent, acute, and chronic. The virus is believed to be a strain of tobacco necrosis with a thermal death point at 88° C. and a dilution end point at 1 in 50,000. It is not transmissible to *Plantago major*, *P. minor*, or *P. lanceolata*. Infected tobacco leaves yielded the virus in the form of rhomboid crystals. It was destroyed by soil disinfection with formalin at a concentration of 2·5 l. per cu. m.

Pflanzenschutzbestimmungen im Ausland. Dänemark. [Foreign plant protection provisions. Denmark.]—*Amtl. PflSchBestimm.*, N.F., 5, 3, pp. 156–157, 1953.

The following are some of the provisions for the control of cereal black rust (*Puccinia graminis*) in Denmark announced by the Ministry of Agriculture on 11th February, 1953. Species and varieties of *Berberis* [*R.A.M.*, 33, p. 279], together with *Mahoberberis neubertii*, may be grown only in botanical gardens attached to educational institutions or out-of-doors in connexion with phytopathological experiments organized by the State. Excepted from this regulation (pending proof

of their susceptibility to the rust and unless they are grafted on common barberry or other susceptible stocks) are *B. aggregata*, *B. dictophylla*, *B. parvifolia*, *B. polyantha*, *B. sieboldii*, *B. thunbergii* and its varieties *erecta*, *tricolor*, and *atropurpurea*, and evergreen species (excluding *M. neubertii*).

List of intercepted plant pests, 1952.—*S.R.A., Bur. Ent., Wash.*, 59 pp., 1953. [Received February, 1954.]

The following were among the pathogens, apparently not hitherto established in the United States, which were intercepted on air-borne plant material entering the country between 1st July, 1951, and 30th June, 1952 [cf. *R.A.M.*, 32, p. 421]: *Cercospora coffeicola* on coffee [C.M.I. map No. 59] from Brazil; *Coniothyrium laburnophilum* on laburnum from Denmark; *Elsinoe australis* on lemon, sweet, sour and mandarin oranges, and sour lime [No. 55] from Brazil (76 specimens), Argentina (57), and Uruguay (one); leprosis virus on orange [*R.A.M.*, 32, p. 421] in eight samples from Mexico and one each from Egypt, Haiti, and Panama; *Phoma* [*Guignardia*] *citricarpa* [33, p. 411] on oranges from China and Japan and on citrus peel from China; and *Xanthomonas citri* [C.M.I. map No. 11; *R.A.M.*, 32, p. 421] on lime from India. *X. citri* was also found in 55 consignments (mostly of orange and lemon) from Japan, 16 from China (15 on orange and one on peel), one from Ceylon on orange, one each on sour lime from Malaya and the Philippines, and two on pomelo from Thailand. *X.* sp. (?), the agent of cancrosis B [loc. cit.], was detected six times on lemon and once on grapefruit from Argentina. Five lots of *Rhododendron ferrugineum* from Switzerland and one from Hungary, four of *R.* sp. from the former country, and one each of *R. hirsutum* from England and Germany harboured *Chrysomyxa rhododendri* [loc. cit.]. Other interceptions included *Cercospora purpurea* on avocado [26, p. 147]; *Cryptospora longispora* on Norfolk Island pine [*Araucaria excelsa*] from Australia and Norfolk Island; *Gymnosporangium haraeanum* on Chinese and dwarf junipers [*Juniperus chinensis* and its var. *japonica*: 33, p. 94]; *Macrophomina phaseolina* [*M. phaseoli*] on *Ixia viridiflora*, *Morea spathacea* (both from South Africa), *Iris nigricans* (Jordan), and sweet potato [14, p. 670 *et passim*]; and *Sphaceloma fawcetti* var. *scabiosa* on lemon, grapefruit, and an undetermined species of citrus from Australia [33, p. 292].

Lavezzini (V.). **Aspetti e sviluppi della difesa fitosanitaria in Provincia di Parma.** [Aspects and developments of phytosanitary defence in the Province of Parma.] —*Notiz. Malatt. Piante*, 24–25, (N.S. 3–4, *1954*), pp. 21–42, 1954.

In the section of this paper concerned with fungi, read at the second convention of the Società italiana di Fitoiatria, held at Parma in September, 1953, the author gives notes on a number of diseases in the Province of Parma. Wheat bunt [*Tilletia* spp.: *R.A.M.*, 30, p. 315; 33, p. 222] and smut [*Ustilago tritici*: 18, pp. 447, 580] became very prevalent towards the end of the war and remained so for a short time afterwards. Locally, smut has been somewhat severe recently; growers are recommended to change the source of seed supply and, if possible, to use selected seed. Downy mildews of vine [*Plasmopara viticola*: 33, p. 436] and tomato [*Phytophthora infestans*: 16, p. 132; 33, p. 437] were very severe in 1953, tomatoes suffering a reduction in yield of at least one quarter as a result of infection by *P. infestans* and other fungi, in spite of five to six applications of copper sprays.

Notes phytosanitaires. Évolution des maladies des plantes en 1951. [Phytosanitary notes. The development of plant diseases in 1951.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 4, 4, pp. 511–515, 1953.

This annotated list of fungal, bacterial, and virus diseases of plants reported in France in 1951 contains the following records. *Aphanomyces euteiches* on pea

seedlings [C.M.I. map No. 78] and *Phytophthora fragariae* on strawberry [*R.A.M.*, 30, p. 174] were widespread. Strawberry fruits in the Paris area and rhododendron branches in Anjou were attacked by *P. cactorum*. *Gibberella fujikuroi* [C.M.I. map No. 102] and *Macrophomina phaseoli* were found on maize in the Landes; *Guignardia baccae* on vines [cf. *R.A.M.*, 28, p. 51; 32, p. 419] in Gard and Hérault; *Keithia thujina* on *Thuja* sp. [cf. 28, p. 442] at Gambais, Seine-et-Oise; *Mycosphaerella cerasella* on cherry trees [cf. 16, p. 20] in the Basses-Pyrénées, near Montpellier, in the Paris area, Gard, and Drôme; and *Venturia chlorospora* on *Salix babylonica* at Rennes [cf. 28, p. 159; 32, p. 519]. At Versailles *Dianthus barbatus* developed severe infection by *Puccinia arenariae* [cf. 30, p. 568]. At Nantes *Cercospora melonis* [*Corynespora cassiicola*: 32, p. 342] caused canker of melon stems. Serious collar rot of beans [*Phaseolus vulgaris*] at Rennes and of violets [*Viola* sp.] near Toulouse was due to *Thielaviopsis basicola* [C.M.I. map No. 218]. Rose trees in various parts of France were affected by tracheomycosis (*Verticillium albo-atrum*).

Schreier (O.). **Pflanzenkrankheiten und -schädlinge im Jahre 1952.** [Plant diseases and pests in the year 1952.]—*Pflanzenarzt*, 6, 2, pp. 3–4, 1953.

This brief report [cf. *R.A.M.*, 33, p. 138 and next abstract] includes the following new disease records for Austria: *Alternaria* leaf disease of cineraria [*A.* ?*zinniae*: 30, p. 140] and true mildew on laburnum [? *Microsphaera guarinonii*].

Schreier (O.). **Das Auftreten wichtiger Schadensursachen an Kulturpflanzen in Österreich im Jahre 1953.** [The occurrence of important causes of injury to cultivated plants in Austria in the year 1953.]—*PflSchBer.*, 12, 1–2, pp. 15–24, 1954.

The following information, besides items already noticed from other sources, is presented in this report [cf. preceding abstract]. New records for Austria include *Pseudomonas savastanoi* var. [f. sp.] *nerii* on oleander [cf. *R.A.M.*, 31, p. 225], *Cercosporella brassicae* on Chinese cabbage [C.M.I. map No. 197], and *Septoria ribis* [*Mycosphaerella grossulariae*] on black currant. There was a remarkable increase of viroses among vegetable-garden plants, onion yellow dwarf virus being specially prevalent. Tomato streak virus disease was widespread and cases of leaf curl virus infection on pelargonium and dahlia were also observed.

Voelcker (O. J.). **Annual Report of the Department of Agriculture, Malaya, for the year 1952.**—65 pp., 5 pl., 1 col. map, 1953.

In this report [cf. *R.A.M.*, 32, p. 303] it is noted (pp. 23–39) that young oil palms at Johore were attacked by a heart rot following flooding of the nursery. A previously unrecorded disease affected seedlings in Selangor: numerous small, brown spots were formed on the leaves, which dried and died prematurely, the whole plant sometimes succumbing. An unidentified fungus was isolated which reproduced the disease in healthy seedlings.

Broken core disease of pineapple [17, p. 193] appeared to be increased by decrowning the fruits during growth. Mature fruit collapse, a soft rot which develops within 24 hours, is associated with several species of bacteria [cf. loc. cit.]. Young plants were affected by a heart rot causing death of the central shoot; some recovered by producing healthy buds from the base. The disease was reproduced by the inoculation of pricked heart tissues with bacteria isolated from rotted material. Green die-back, characterized by the light green colour of the leaves, which are narrower, more upright, and smaller than normal, the plant becoming reduced in size and sometimes dying, was eliminated by spraying with copper sulphate or perenox. A bacterial soft rot of the suckers may be prevented by the thorough drying of planting material. *Curvularia lunata* and *C. maculans* were associated with a leaf spot disease.

Lowland tea was free from *Exobasidium vexans* [33, p. 54]. At the Federal Experiment Station, Cameron Highlands, bushes sprayed during recovery from pruning produced a lower yield than the unsprayed [cf. 32, p. 367].

A bacterial wilt of Manila hemp [*Musa textilis*] at the Federal Experiment Station, Serdang, was found to be due to *Xanthomonas* [*Pseudomonas*] *solanacearum*. Stem canker and seedling damping-off of jute was caused by *Colletotrichum capsici*. *Puccinia sorghi* and *Helminthosporium turcicum* on maize [32, p. 303] were reduced by weekly applications of 0·25 per cent. perenox, which, however, caused severe leaf scorch and gave no increase in yield. The growth of young derris plants [*Derris elliptica*] infected by *C. derridis* [cf. 33, p. 258] was improved by copper sprays [cf. 31, p. 86]. A *Fusarium* wilt of cowpea at Kuala Lumpur was reduced by soil treatment with chloro-bromo-propene at 4 ml. per sq. ft.

In a resistance test at the Federal Experiment Station, Serdang, none of the commoner banana varieties has become infected by *F. oxysporum* f. *cubense* [32, p. 303] within five months of planting. *Sclerotium rolfsii* was observed for the first time on banana, causing a basal stem rot.

New disease records included *Ganoderma pseudoferreum* [33, p. 256] on *Peltophorum ferrugineum*, *Enterolobium cyclocarpum*, *Parkia roxburghi* (all shade trees), and *Crotalaria anagyroides*; *Fomes lignosus* was found on annatto [*Bixa orellana*]; *Corticium solani* caused leaf rot of *Commelina nudiflora*, *Vigna marina*, *Borreria latifolia*, black gram [*Phaseolus mungo*], choy sam [turnip], four-angled bean [*Cyamopsis tetragonoloba*], soy-bean, and snake gourd [*Trichosanthes anguina*], and damping-off and stem rot of tomato.

Detailed Reports of the Subordinate Officers of the Department of Agriculture, Madras, for 1943–44, 1944–45, 1948–49, 1949–50, 1950–51.—84 pp., 1950; 81 pp., 1951; 102 pp., 1950; 121 pp., 1951; 133 pp., 1952. [Received December, 1953.]

The following information is presented in the reports of the Government Mycologists [cf. *R.A.M.*, 21, p. 362]. In the first two reports K. M. Thomas (pp. 51–84, 52–81) describes field experiments on varietal resistance of rice to *Piricularia oryzae* [33, p. 112]. Less than 10 per cent. natural infection was recorded on 35 long- and three medium-duration varieties compared with 48·2 and 36·5 per cent., respectively, on the susceptible Adt. 10, with which they were intercropped. In field tests for resistance to foot rot (*Fusarium moniliforme* var. *majus*) [*Gibberella fujikuroi*: 32, p. 177], 16 out of 32 foreign and 18 out of 25 local varieties grown from inoculated seed showed less than 9 per cent. infection, the very susceptible controls (Co. 10) having 22·8 and 29·2 per cent., respectively. In investigations on the control of sorghum smut [*Sphacelotheca sorghi*: 32, p. 676] soaking in water and drying in the sun or shade reduced incidence but not to such an extent or so economically as sulphur treatment.

For the years 1948–49 and 1949–50 D. Marudarajan reports (pp. 63–78, 106–121) that the rice varieties GEB. 24 and PTB. 7 were highly resistant to four isolates of *G. fujikuroi*.

In the report for 1950–51 T. S. Ramakrishnan (pp. 118–133) lists 29 rice varieties showing less than 6·6 per cent. neck infection by *P. oryzae* as compared with 81·1 per cent. in Adt. 10; 18 varieties have been selected from the world collection for further intensive field trials. PTB. 7 was highly resistant to *G. fujikuroi* under conditions of high incidence while GEB. 24 exhibited 42 per cent. mortality. Of 11 fungicides tested (at 1 part to 448 parts of grain by weight), all gave good control of foot rot, the best being certosan (1 per cent. mortality) and agrosan GN (0·8).

Thirty-four sorghum lines belonging to nine species showed either complete freedom from rust (*Puccinia purpurea*) [29, p. 505] or less than 4 per cent. infection.

Hybrids between *Pennisetum typhoides* and *P. purpureum* were highly resistant to *Puccinia penniseti* [29, p. 148]. Sorghum long smut (*Tolyposporium ehrenbergii*) [32, p. 543] increased in severity in the Madurai, Ramanathapuram, and Tirunelveli districts.

A common weed in cotton fields, *Hibiscus vitifolius*, was found to carry infection by *Xanthomonas malvacearum* [32, p. 253].

Rhizome rot of ginger, due to *Pythium* spp. [21, p. 364] and *Sclerotium rolfsii* [33, p. 114], was prevalent on the west coast of Madras. Treatment of the rhizomes with 0·1 per cent. mercuric chloride or 0·25 per cent. ceresan prevented storage rot; field wilt was best controlled by soil applications of Cheshunt compound and colloidal copper.

In the commercial production of ergot (*Claviceps purpurea*) on rye in the Nilgiris [24, p. 369] a yield of 403 lb. was obtained from 73 acres, rather low because of dry weather during the flower infection period. The Government gave permission for the extension of ergot cultivation on a permanent basis from April, 1951, and during the 1951–52 season 52 acres were sown.

Miller (P. R.). **Plant disease situation in the United States.**—*F.A.O. Pl. Prot. Bull.*, 2, 2, pp. 24–27, 1953.

Virus yellows is the most important disease of seed table beets in the Puget Sound region of north-western Washington [*R.A.M.*, 32, p. 414; 33, p. 400], where it has been present for many years, though not at first distinguished from mosaic virus. Cultural practices in the area have helped to perpetuate the disease. Root beds have been planted indiscriminately, often adjacent to maturing seed fields. Aphid migration has resulted in widespread infection of seedlings, and incidence in beet, mangel, and Swiss chard is often 100 per cent. Spinach is also infected. Of various chemicals tested, only systox [33, p. 6] (not yet approved for use on any food crop) gave appreciable control of the vector on beet stecklings grown in the vicinity of the seed-producing area.

In June, 1952, mature perithecia of *Ophiobolus graminis* were found on Royal wheat stubble near Hutsonville, Illinois [cf. 29, p. 552].

A survey of soy-bean diseases in Mississippi in 1951 and 1952 showed that bacterial pustule (*Xanthomonas phaseoli*) [var. *sojensis*: 31, p. 267; 32, p. 416; 33, p. 64] was present in almost every field examined; bacterial blight (*Pseudomonas glycinea*) [loc. cit.] occurred in some fields but was less severe than pustule. Wildfire (*P. tabacum*) [loc. cit.] was found in 1951 only. Downy mildew (*Peronospora manshurica*) [33, p. 275] was prevalent in both years; two types of leaf lesion were noted on some strains, one of pin-point size and the other $\frac{1}{2}$ to 1 cm. in diameter, and it appears that two races of the fungus may be present [cf. loc. cit.]. Southern blight (*Sclerotium rolfsii*) occurred in both years. New records for Mississippi included a leaf spot caused by *Phyllosticta* sp. [32, p. 416] prevalent early in the 1951 season, target spot (*Corynespora cassiicola*) [32, p. 342], to which varietal differences in susceptibility were apparent, purple seed stain (*Cercospora kikuchii*) [33, p. 462], and anthracnose (*Colletotrichum* spp.). Late in the growing season of both years a leaf, stem, and pod spotting was present; a *Cercospora* sp. was isolated frequently from the lesions. The leaf spots varied in size from pin-points to 5 mm. in diameter, sometimes coalescing; they were reddish-brown with grey centres and when numerous the whole leaf had a dull, rusty appearance. Some varieties became prematurely defoliated. The oval to elongated stem spots measured from 2 to 30 by 1 to 5 mm., and frequently coalesced to form large reddish-brown, later grey or black areas. The discrete pod spots measured up to 2 mm. in diameter. Soy-bean mosaic virus [28, p. 205] was found in both years, and bean yellow mosaic [loc. cit.] for the first time in 1952; neither disease appears to be important locally.

Constain (J. C.). **Mezclas entre fungicidas, fertilizantes y fitohormonas en aspersiones sobre arboles de Cacao.** [Mixtures of fungicides, fertilizers, and phytohormones in sprays on Cacao trees.]—*Acta agron. Palmira*, 3, 4, pp. 229–250, 2 figs., 5 graphs, 1953.

The results of experiments performed at the Agricultural Experiment Station, Palmira, Colombia, to determine the practicability of spraying cacao trees with mixtures of fungicides, fertilizers, and phytohormones are described and tabulated. Bordeaux mixture, recommended for the control of the two diseases most prevalent in the country, moniliasis [*Monilia roreri*: *R.A.M.*, 30, p. 145] and pod rot (*Phytophthora* [*palmivora*: loc. cit.]), causes a heavy flower drop, which may be prevented by the admixture of a hormone, e.g., sodium salt of *p*-chlorophenoxyacetic acid (known commercially as fitomon 4 and parmone). A nutrient substance, such as urea or calcium glycerophosphate, may also be incorporated.

A new biological test was devised for assaying the efficiency and compatibility of the various combinations. A coloured thread was tied round the peduncles of 100 flowers that opened at dawn on the day of the operations (which were carried out between 6 and 8 a.m.), all those already open having been removed the day before; at the same time 100 on the same tree left untreated were marked with a white thread. Whereas five days later no untreated flowers were left and none sprayed only with Bordeaux mixture 4–4–50, copper oxychloride, zineb (both at 0·37 per cent.), or urea (0·5 per cent.), the numbers remaining after treatment with other formulations were as follows: Bordeaux mixture+urea+hormone, 28; Bordeaux mixture+calcium glycerophosphate+hormone, 36; copper oxychloride+urea+hormone, 26; copper oxychloride+calcium glycerophosphate+hormone, 40; zineb+urea+hormone, 32; and zineb+calcium glycerophosphate+hormone, 36. Increases in fruit production resulting from the treatments were estimated as follows (in percentages): hormone alone or combined with zineb and calcium glycerophosphate, 117; calcium glycerophosphate, 17; Bordeaux mixture+hormone, 33; zineb+hormone, 77; urea+hormone, 50; calcium glycerophosphate+hormone, 133; Bordeaux mixture+urea+hormone, 42; copper oxychloride+urea+hormone, 8; zineb+urea+hormone, 17; and Bordeaux mixture or copper oxychloride+calcium glycerophosphate+hormone, 77.

Chatt (Eileen M.). **Cocoa.**—xiv+302 pp., New York, Interscience Publishers Inc.; London, Interscience Publishers Ltd., 1953. $8.50.

Included in this monograph describing every stage in the production of commercial cocoa is a chapter (IV) on the pests and diseases of cacao (pp. 57–78). The present state of knowledge about cacao swollen shoot virus and red mottle (Trinidad) virus is summarized. Lists of the fungi attacking the roots, stems, and pods of the plant [*R.A.M.*, 14, p. 224] and brief notes on the symptoms, etiology, and control of black pod disease (*Phytophthora palmivora*) [see preceding and next abstracts], *Monilia* pod rot [*M. roreri*: see preceding abstract], and witches' broom (*Marasmius perniciosus*) are given. Other references to fungi and micro-organisms are those on mycorrhiza included in chapter III, on fermentation (pp. 101–105) and storage (p. 199), and in a brief reference to breeding (pp. 54–55).

Orellana (R. G.). **Estudios sobre la podredumbre de la fruta del Cacao causada por Phytophthora en Costa Rica.** [Studies on pod rot of Cacao caused by *Phytophthora* in Costa Rica.]—*Turrialba*, 4, 1, pp. 35–38, 1 fig., 1954. [English abstract.]

The following method is used at the Inter-American Institute for Agricultural Sciences, Turrialba, Costa Rica, for testing the resistance of cacao clones to *Phytophthora palmivora* [*R.A.M.*, 33, p. 340]. A drop of standardized spore suspension is

deposited on mature, unwounded, surface-sterilized cacao pods which are then arranged at random in a moist wooden box maintained at 100 per cent. relative humidity and a temperature of 21° to 27° C. Lesion development is measured daily for seven days after which the pods are cut and lesion depth is measured. Differences in clonal susceptibility have been observed. In UF-613 rot penetrated to the endocarpic layers but in UF-12 the discoloration was only superficial. A further test showed purple podded types to be more susceptible than green ones.

Spray experiments [28, p. 565; 32, p. 476] indicated that perenox gave as effective control as Bordeaux mixture and was equally adhesive at the rate of 2 lb. in 100 gals. water.

Chaves (G. M.). **Método bioanalítico para evaluación comparativa de adherentes en fungicidas orgánicos.** [A bio-assay technique for the comparative evaluation of adhesives in organic fungicides.]—*Turrialba*, 4, 1, pp. 39–42, 1 fig., 1 graph, 1954. [English abstract.]

A bio-assay technique developed at the Inter-American Institute for Agricultural Sciences, Turrialba, Costa Rica, showed promise for the comparative evaluation of stickers [*R.A.M.*, 33, p. 164] with the fungicide captan. Young cacao plants were atomized with the fungicide alone at 4 lb. per 100 gals. and mixed with Armour Sticker (1 lb.–100), P.E.P.S., or RDA-156 (both at 1 pint in 100 gals.). The relative amounts of fungicide retained on the leaf surfaces were determined by placing leaf disks on potato dextrose agar plates seeded with spores of *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] and measuring the inhibition zone after 18 hours at 25° C. Tested three hours after spraying there was no significant difference between the four treatments. Five days later when the plants had received 2·11 in. rain the inhibition zone resulting from treatment with captan plus P.E.P.S. was significantly larger (2·59 sq. cm.) than that secured with the fungicide alone (0·34) or with Armour Sticker (1·2); with RDA it was 2·01. After 13 days and 2·45 in. rainfall there was no inhibition with captan alone or plus Armour Sticker but captan plus P.E.P.S. gave 2·08 sq. cm. inhibition and RDA, 1·83. Inhibition also occurred when phygon, karbam (76 per cent. ferbam), bioquin 1, and zerlate (76 per cent. ziram), all at 4 lb.–100 were used, but not parzate (65 per cent. zineb) or crag 658.

Machacek (J. E.). **Co-operative seed treatment trials—1953.**—*Plant Dis. Reptr*, 38, 3, pp. 169–172, 1954. [Multilithed.]

In the 1953 trials at 17 stations in Canada and nine in the United States [cf. *R.A.M.*, 33, p. 286] 30 treatments were compared on naturally infected or damaged seed for the control of wheat bunt (*Tilletia foetida*) and seedling blight (*Helminthosporium sativum*), smuts of oats (82 per cent. *Ustilago avenae* and 18 per cent. *U. kolleri*) and barley (96 per cent. *U. nigra* and 3·7 per cent. *U. nuda*), and flax seed-rot (caused by miscellaneous soil fungi). Of the 11 treatments tested for the first time, the dusts puratized C4–10 (1 oz. per bush.) and puratized C13–1212 (0·5) allowed no more than 1 per cent. bunt or smut; ortho seed guard dust was very effective against wheat seedling blight and flax seed rot, increasing emergence from 65·3 (untreated) to 77·1 per cent. and from 19·8 to 36 per cent., respectively, the corresponding figures for orthocide 75 dust being 73·6 and 36·6. All the 16 products on sale in Canada prior to 1953, except mercury-lindane dust, were effective against wheat bunt, reducing infection from 23·6 per cent. to less than 1 per cent. Effective against oat smuts were ceresan M dust (0·5 oz. per bush.), half-ounce leytosan dust (0·5), leytosan G. 91 (1·4), mergamma C dust (1·4), merlane dust (1·4), panogen 14 fluid (0·75), and PMAS (10 per cent. in water; 0·5 oz.). Against barley smuts ceresan M, agrox C (0·5), half-ounce leytosan, leytosan G. 91, mercury-lindane (1·2), mergamma C, merlane, and PMAS (10 per cent. in alcohol) were effective; against

wheat seedling blight ceresan M, agrox C, half-ounce leytosan, leytosan G. 91 (2 oz.), mergamma C (2), and leytosol C; and against seed rot of flax ceresan M (1·5), agrox C (1·5), mergamma C (5), panogen 14 (1·5), and PMAS (10 per cent. in alcohol, 1·5 oz.).

The results of greenhouse trials to determine the optimum storage periods for cereal seed treated with some of the newer dressings indicated that wheat grain infected with bunt and treated with tritisan C, anticarie, bunt cure, or bunt-no-more need not be stored before sowing, but treatment with organic mercurials is most effective when followed by a minimum of four days' storage instead of one day as previously recommended. The recommended eight-day storage period for oats and barley appears adequate.

Vallega (J.) & Favret (E. A.). **Las royas de los cereales en Argentina I. Características patógenas de las distintas especies de royas.** [Cereal rusts in Argentina I. Pathogenic characteristics of the different rust species.]—*Idia*, 5, 54, pp. 17–39, 7 graphs, 14 maps, 1952. [Received 1953.]

The information here presented concerning the distribution and pathogenicity of the wheat rusts (*Puccinia graminis*, *P. rubigo-vera tritici* [*P. triticina*], and *P. glumarum*) in Argentina and adjoining countries [cf. next abstract] from 1939 to 1951 has already been noticed from another source [*R.A.M.*, 30, p. 513; cf. 33, p. 220]. Race 1 of oat crown rust (*P. coronata avenae*) [loc. cit.; 30, p. 518] predominated in Argentina each year in relation to 45, 55, and 56; it also occurred in Brazil, Uruguay, Chile, and Venezuela. Samples from Chile in 1942 yielded an unidentified race which attacked Ruakura only slightly and Victoria, Bond, and Glabrota not at all. Races 3 and 7 of *P. g. avenae* [33, p. 220] prevailed in Argentina until 1950 when varieties resistant to them were attacked by race 4. Both 3 and 7 also occurred outside the cereal belt, the latter being found in the north and in Patagonia. Race 4 appears to be confined mainly to the vicinity of the capital but has also been reported from Buenos Aires province. In 1951 it was found on material from Uruguay.

The barley varieties Bolivia C.I. 1257 and Quinn C.I. 1024 were unaffected by a severe attack of leaf rust (*P. anomala*) [*P. hordei*: loc. cit.] in 1951.

Two races of maize rust (*P. sorghi*) in addition to A and B [25, p. 260] have been found in Argentina, though A is still the most prevalent.

[This paper also appears as *Publ. técn. Inst. fitotecn.* 69, 1952.]

Villanueva Novoa (R.) & Rojas Mendoza (E.). **Pruebas de resistencia en invernáculo, con las razas, 14, 15B y 17 de Puccinia graminis tritici y de otros caracteres en material progenitor y en híbridos de primera generación de Trigos.** [Greenhouse tests on parental material and first-generation Wheat hybrids for resistance to races 14, 15B, and 17 of *Puccinia graminis tritici* and other characters.]—*Inf. Cent. Invest. agríc., Lima*, 82, 16 pp., 2 figs., 1953. [English summary. Mimeographed.]

A tabulated survey is presented of greenhouse tests at the Agricultural Experiment Station 'La Molina', Lima, Peru, of seedling reaction to inoculation with races 14, 15B, and 17 of *Puccinia graminis* [*R.A.M.*, 25, p. 62 and cf. preceding abstract] of nearly 60 wheat varieties used as parents in the breeding programme and of about 150 F_1 hybrids to a mixture of races 15B and 17, while both lots were similarly examined for resistance to *Erysiphe graminis*.

Among the parental varieties immune from or highly resistant to all three races of *P. graminis* were Marina, Mariquenya, Merebal, Rewarho, Macmubal, 1404 (Galgalos × Kenya 1075–1), Mentana, 1409 (Mentana × Gracia Caucasia 400–1), 1427 (Fronteira × (K-G)), 1433 (Newthatch × Mentana), 523–6, II–44–29 Kenya

58×Newthatch, P.I. 124738 Kenya C 6042, S443 Mentana×Kenya 35024, and S35012 Supremo×Kenya. Resistance in some of the F_1 hybrids was expressed by a necrotic reaction. A strong reaction characteristic of the Kenya 58 factor to race 17 at high temperatures is indicated by the grades Xn (heterogeneous-necrotic) and Xc (heterogeneous-chlorotic).

Resistance to *E. graminis* was shown by the parental lines Marina, Maribal, Mariache, Merebal, Rewarho, H44×Thatcher, 754, 1025, 1039, 1286, 1288, Industrial Argentino, II–44–29 Kenya 58×Newthatch, Centeno rye, SR, 1300, 1309, 1313, 1327, 1339, 12633, and a considerable number of the F_1 hybrids.

Hassebrauk (K.). **Untersuchungen über die Einwirkung von Sulfonamiden und Sulfonen auf Getreideroste. IV. Anatomische Untersuchungen über den Infektionsverlauf bei mit Sulfonamid behandelten Getreidekeimpflanzen.** [Studies on the action of sulphonamides and sulphones on cereal rusts. IV. Anatomical studies on the course of infection in cereal seedlings treated with sulphonamide.]—*Phytopath. Z.*, 21, 2, pp. 218–220, 1953.

At the Brunswick branch of the German Biological Institute wheat seedlings were inoculated with *Puccinia triticina* and oats with *P. coronata*, and treated on the same day with ladogal at concentrations of proved efficiency [*R.A.M.*, 32, p. 243]. Sections of these and controls were cut after 24 hours and again at further 24-hour intervals, fixed, and stained by a modification of Buxbaum's method (*Mikrokosmos*, 40, pp. 173–174, 176, 1951) in iron haematoxylin+0·5 per cent. light green (or alizarin) in the ratio of 2 : 1 for 2 to 2½ hours.

In the leaves of all series the mycelium developed intercellularly from the day of inoculation onwards, but its progress appeared to be less steady and regular in the plants sprayed with ladogal than in the unsprayed or in equivalent seedlings given a supplementary treatment with *p*-aminobenzoic acid [vitamin H'] or folic acid [Bc] after inoculation and spraying. Uredosori were formed in all the leaves except the ladogal-treated.

These data fully corroborate the hypothesis, based on the results of previous experiments, that sulphonamide treatment does not preclude rust infection but inhibits fructification as long as the host remains deficient in vitamin H' or Bc, the determining factor in sporulation.

Trentin (A.). **Prove contro la carie. L'efficacia di alcuni prodotti polverulenti.** [Tests against bunt. The efficacy of some dust products.]—*Ital. agric.*, 90, 6, pp. 414–420, 1 fig., 1953. [Received June, 1954.]

Experiments were conducted at the Istituto di Tecnica Agraria 'N. Strampelli', Lonigo, Italy, during 1951 to 1952 to determine the efficacy of seven dusts, including F.B.1 (cariocide), F.B.3, and S.65 (containing 12, 30, and 20 per cent. BHC [*R.A.M.*, 33, p. 289 and following abstracts], respectively) in controlling light and heavy artificial infections of bunt (*Tilletia caries* and *T. foetida*) on the grain of spring sown Mentana wheat and autumn sown S. Pastore. The results obtained apply only to the heavily inoculated series, little or no infection being observed in plots sown with lightly infected or immune seed. The optimum results (no infection) were obtained with 12 per cent. BHC dusts used at 2 gm. per 1,000 gm. seed and with agrosan; untreated spring and autumn sown seed contracted 76·2 and 48·8 infected spikes, respectively.

Pichler (F.). **Zur Frage der Gaswirkung von Saatgutbeizmitteln, insbesondere von quecksilberhaltigen Präparaten.** [On the question of the vapour action of seed disinfectants, especially of mercury-containing preparations.] —*PflSchBer.*, 11, 1–2, pp. 1–11, 2 figs., 1953. [English summary.]

At the Institute for Plant Protection, Vienna, the author not only corroborated

Gassner's findings as to the emission by mercury alkyls, e.g., abavit-neu and ceresan, of vapours fungicidal to wheat bunt (*Tilletia tritici*) [*T. caries*: *R.A.M.*, 31, p. 428] but demonstrated that emissions also take place from phenyl mercury compounds, e.g., epro and gervit [32, p. 241], containing phenyl mercury acetate, and germisan (phenyl mercury pyrocatechol). Such vapours are readily absorbed by, and impart their fungicidal properties to inert materials in their vicinity, such as talcum powder. Tritisan, the active principle of which is pentachloronitrobenzol, also emits a vapour toxic to *T. caries*. The vapour of BHC retards the germination of wheat bunt spores [cf. 32, p. 308 and preceding and next abstracts], but the product is not sufficiently toxic to be used as a seed dressing.

Mercurial preparations should be kept in sealed containers in a cool, dry place which is not occupied for any length of time by humans or livestock.

Zobrist (L.) & Thiollière (J.). **Neue Mittel zur Bekämpfung der Korn- und Boden-'Infektion' des Weizensteinbrandes.** [New methods for the control of seed and soil 'infection' by Wheat bunt.]—*Phytopath. Z.*, 21, 3, pp. 311–322, 4 figs., 1954. [English summary.]

In this joint contribution from the Biological Laboratory of Dr. Maag A. G. Dielsdorf, Switzerland, and the Dargoire Experiment Station, Péchiney-Progil, Lyons, France, the rise in the frequency of wheat bunt (*Tilletia tritici*) [*T. caries*] of recent years is attributed in the main to the increase in mechanical threshing in the field [cf. below, p. 542]. To meet this changed situation both seed and soil disinfection are required and preparations based on BHC [see preceding abstract] have been developed. They were tested in the laboratory by Gassner's method [*R.A.M.*, 22, p. 490] and in the field by mass inoculation of the grain with a highly pathogenic strain of the fungus at a dosage of 6 gm. spores per kg. seed and of the soil at 1 gm. per sq. m. At a concentration of 10 per cent. these fungicides proved to be much more effective against bunt than the standard mercury seed dressings or those containing copper or thiram, owing to the release of active gas by BHC. Thus, on plants from seed sown in November, 1952, the average percentages of infection from seed, soil, or both these sources in the BHC-treated plots were 0·8, 2, and 3·1, respectively, compared with 30·5, 51·1, and 47·5 respectively, for organic mercurials and 76·3, 51·3, and 69·9, respectively, for the untreated. No comparably effective control was obtained in plots treated with copper compounds or thiram. October-sown stands contracted less infection from the seed and more from the soil than the November-sown, and combined infection was very much greater on the former.

Wagner (F.). **Versuche zur Bekämpfung des Zwergbrandes an Weizen mit verschiedenen Bodenbehandlungs-Mitteln und Verfahren.** [Experiments on the control of Wheat dwarf bunt with various materials and procedures for soil treatment.]—*Z. PflBau*, 4 (48), 4, pp. 145–151, 1953.

In further experiments in 1952 -3 on the control of wheat dwarf bunt (*Tilletia brevifaciens*) in inoculated soil at the Bavarian Institute for Agriculture and Plant Protection [*R.A.M.*, 33, p. 224] brassicol at 50 kg. per ha. applied four weeks after sowing was completely effective, the spores requiring a resting period of that duration before they germinated. The fungicide should be lightly scattered over the soil surface without incorporation, whereas preparation A, which also gave good results in one test when applied at the same rate as brassicol immediately after sowing, requires to be lightly worked into the soil.

The best of the sprays for direct treatment of the soil after sowing were B and C, used at a concentration of 1·8 per cent. with a consumption of 800 l. per ha. Even at a lower strength (0·45 per cent.) they proved superior to 3 per cent. copper

sulphate, 0·75 per cent. copper-lime, and an [unnamed] organo-mercurial at 0·5 per cent.

In 1951–2 soil amendments with nitro-chalk [32, p. 241] (200 and 400 kg. per ha.) applied three weeks or 10 days before sowing increased the percentage of dwarf bunt, but in 1952–3 a postponement of the application (400 kg.) until 10 days after sowing resulted in a reduction from 6 per cent. to a trace.

Conners (I. L.) & Skolko (A. J.). **Bunt situation in winter Wheat in Ontario.**—*Canad. J. agric. Sci.* (formerly *Sci. Agric.*), 33, 6, pp. 597–605, 1 pl., 1 map, 1953.

Of 93 samples of winter wheat from one district in Ontario in 1952, one bore spores of *Tilletia brevifaciens* [*R.A.M.*, 32, p. 667], *T. caries* [33, p. 288], and *T. foetida* [loc. cit.], 20 were free from bunt, and the remaining 72 were lightly to heavily contaminated with spores of *T. foetida*. The Grain Inspection records for eastern Canada confirm the prevalence of bunt, which has been heavy in recent years on winter wheat in Ontario. This prevalence may be due to the practice of late sowing, favourable to bunt development, to avoid damage from Hessian fly [*Phytophaga destructor*].

Hiratsuka (N.) & Sato (S.). **Studies on the rust resistance of cereals, III. Susceptibility of various species of Hordeum and its related genera to the leaf-rust of Barley, Puccinia hordei Otth.**—*Jap. J. Breed.*, 3, 2, pp. 59–64, 1953. [Japanese.]

In further work in this series [cf. *R.A.M.*, 33, p. 145] the resistance of cereals and grasses to two physiologic races (I and III) of *Puccinia hordei* [28, p. 519] was tested in Japan. *Hordeum agriocrithon*, *H. distichum* var. *tridax*, *H. spontaneum*, and common barley were susceptible; *H. murinum*, *H. nodosum*, *H. pusillum*, *H. gussoneanum*, and *H. jubatum* were highly resistant or immune. All the other plants tested, i.e., 16 species of *Triticum*, 17 of *Aegilops*, nine of *Agropyron*, four of *Elymus*, *Haynaldia villosa*, *Lolium remotum*, oats, five selections of *Aegilotrichum*, and two of *Agrotrichum* were highly resistant or immune.

Moseman (J. G.). **Results from studies of entries in the uniform Barley powdery mildew nurseries.**—*Plant Dis. Reptr*, 38, 3, pp. 163–166, 1954. [Multilithed.]

Powdery mildew (*Erysiphe graminis*) is one of the major diseases of winter barley [*R.A.M.*, 33, p. 78] in the eastern United States and causes losses of spring barley almost every year, particularly in California and British Columbia. The disease is rarely severe in the drier Great Plains, but occurs frequently near the Great Lakes. When the 1951–2 entries in the Uniform Spring Barley Mildew Nursery were tested in the field at three locations in Canada and two in the United States and for seedling reaction to six physiologic races of the pathogen in the greenhouse the following were resistant [28, p. 519] in all the tests: Franken II from Germany, selections 4666–5 and 17–49001, Palmella Blue, Rabat, Long Glumes, Goldfoil, Hanna, and Stephan. The last three are susceptible to a new race of mildew found in California. In 1952–3 winter barley varieties resistant in the field at Blacksburg, Virginia, and Knoxville, Tennessee, and to five races in the seedling stage were: Algerian, Modia, C.I. 4968, Psaknon, Ricardo, P.I. 180668, P.I. 180669, Kenbar, and Goldfoil.

Mizukami (T.). **Observations on the reactions of plant to the infection of some pathogens. II. On the germicidal action of the water on the wounded parts of the young and adult leaves of Barley inoculated with Fusarium solani and the stability of this action.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 141–143, 1953. [Japanese, with English summary. Received April, 1954.]

In further studies in this series [cf. *R.A.M.*, 33, p. 23] it was found that the oldest

leaves of barley seedlings retained for one day their faculty for germicidal action in water drops inoculated with *Fusarium solani* [loc. cit.] on injured parts, but lost it in three days. The youngest leaves preserved the faculty for more than three days. The germicidal attribute is unstable as it was inactivated by keeping for one day in a moist chamber, heating for ten minutes at 60° and 100° C., and drying at room temperature (18°).

Darpoux (H.) & Faivre-Amiot (A.). **Action de produits du métabolisme du Trichothecium roseum LK sur l'oidium de l'Orge (Erysiphe graminis).** [The effect of metabolic products of *Trichothecium roseum* Link on Barley mildew (*Erysiphe graminis*).]—*Phytiatrie-Phytopharm.* 1, pp. 21–24, 1952. [Received 1953.]

Further studies at Versailles confirmed the curative and preventive effect on barley mildew (*Erysiphe graminis*) of the culture filtrate of strain ML 1050 of *Trichothecium roseum* [*R.A.M.*, 29, p. 576]. A single spray applied as soon as the first symptoms appeared, or 24 hours later, conferred satisfactory protection for about two weeks on inoculated plants in the greenhouse. An irritant substance extracted from the filtrate and applied at 25 mg. per l. three days after first symptom expression was at least as effective as the original solution and considerably more so than trichothecin from the same source and at the same concentration, which was no better than a mixture of wettable sulphur and potassium permanganate.

McKinney (H. H.). **Culture methods for detecting seed-borne virus in Glacier Barley seedlings.**—*Plant Dis. Reptr*, 38, 3, pp. 152 -162, 1954. [Multilithed.]

Studies were carried out at Beltsville, Maryland, to determine the best conditions for the early detection of the seed-borne, mild and very mild virus strains closely related to false stripe virus in Glacier barley [*R.A.M.*, 32, p. 674]. Seedlings were grown in a greenhouse, in a controlled temperature chamber, in light rooms, in total darkness, and out of doors. The development of the characteristic, mildly or moderately chlorotic markings in the first three leaves was favoured by adequate light and constant temperature, 80° F. being adopted for routine testing. Latent virus was detected in less than 2 per cent. of the symptomless seedlings which had been spaced to avoid plant to plant contact. Further tests showed that the type strain of false stripe virus either fails to penetrate to all the embryos in most infected heads or the concentration is too low to be detected in the seedlings. Artificial light may be necessary for greenhouse testing in the dark winter days; apparently symptomless seedlings tested entirely under such conditions should be re-examined in daylight. Climatic conditions in southern Arizona and California may permit out-of-door testing during the autumn and possibly winter. Greenhouse culture appears to be more reliable in the spring barley areas, particularly during periods of sub-normal temperatures.

A two-step testing method, which avoids plant to plant contact and rough handling, is described. Seeds are set 1½ to 2 in. apart in a circle or row in pots. If no symptoms appear the lots from which the seed was taken may be retested in the same manner before concluding that they are virus-free; if there is 20 to 30 per cent. infection healthy seedlings may be saved for propagation if the diseased ones are removed while still small and those adjacent to the infected ones taken away at the second leaf stage. Seed lots with a higher percentage of infection should be retested, the seeds being spaced more widely or sown one to a pot to prevent inter-plant contact.

Healthy seedlings are transplanted to the field, properly spaced and staked to prevent inter-plant contacts through wind whipping, and examined regularly for delayed symptoms, any infected plants being removed.

Böning (K.). **Über eine albinotische Form des Haferflugbrandes Ustilago avenae (Pers.) Jens.** [On an albino form of the loose smut of Oats, *Ustilago avenae* (Pers.) Jens.]—*Z. PflBau*, 4 (48), 4, pp. 151–154, 1 fig., 1953.

In 1952 an ivory-coloured panicle of oats attacked by *Ustilago avenae* was submitted to the Bavarian Institute for Agriculture and Plant Protection. The glutinous, dried mats was reminiscent of covered smut (*U. levis*) [*U. kolleri*], but the hyaline spores were characteristic of *U. avenae* in size and form. Following inoculation with ground-up spore masses of the variant on dehulled seeds in pots and in a field plot, all features of the abnormal specimen were reproduced. The haulms were shorter by the length of a panicle than those of healthy plants, a typical feature of covered smut according to Liro [*R.A.M.*, 3, p. 369], and all the affected panicles were of a pale colour. The fungus strain involved appears to be a genetic form and the name *U. avenae* ssp. *alba* n.ssp. is proposed [without a Latin diagnosis].

Couch (J. N.). **The occurrence of thin-walled sporangia in Physoderma zeae-maydis on Corn in the field.**—*J. Elisha Mitchell sci. Soc.*, 69, 2, pp. 182–184, 8 figs., 1953.

Thin-walled sporangia, 21 to 34 by 45 to 84 μ, of *Physoderma zeae-maydis* [*P. maydis*] were collected on Golden Cross bantam maize in the field at Chapel Hill, North Carolina, in July, 1947 and 1952. They agree in shape with those previously produced only in the laboratory, though larger [*R.A.M.*, 26, p. 357].

Hooker (A. L.). **Relative efficiency of various methods of inducing field infections with Helminthosporium turcicum and Puccinia sorghi.**—*Plant Dis. Reptr*, 38, 3, pp. 173–177, 1954. [Multilithed.]

At Iowa Agricultural Experiment Station a comparison was made of various methods of inducing field infections of maize with *Helminthosporium turcicum* and *Puccinia sorghi* [*R.A.M.*, 31, pp. 13, 61] for use in testing for resistance in breeding programmes. The highest percentage of infection with *H. turcicum* was obtained with two or three hand applications of pulverized, diseased leaves to the leaf whorl in June and July [32, p. 325]. This method was also the most economical and can be used by investigators lacking the facilities for isolating and culturing the pathogen. Infection with *P. sorghi* was best obtained by hypodermic injection of a uredospore suspension, though the procedure may be unsuitable for measuring natural differential resistance; dusting with spores is effective but uneconomical on a large scale. At low levels of infection evaluation of resistance to both diseases is possible in the same nursery and simultaneous inoculation with the two pathogens can be made without any apparent antagonistic effects.

Saccas (A. M.). **Les champignons parasites des Sorghos (Sorghum vulgare) et des Pénicillaires (Pennisetum typhoideum) en Afrique Équatoriale Française.** [The parasitic fungi of Sorghums (*Sorghum vulgare*) and Millets (*Pennisetum typhoides*) in French Equatorial Africa.]—*Agron. trop., Nogent*, 9, 2, pp. 135–173, 21 figs., 1954.

In this monograph the author describes the morphological characters of 47 fungi found on sorghum and six on millet (*Pennisetum typhoides*) in French Equatorial Africa, with notes on their geographical distribution, the damage caused, and their control.

Anthostomella appendiculata n.sp. was found on drooping or dead young terminal leaves of sorghum near M'Baïki (Ubangui-Chari); the perithecia measure 225 to 250 μ in diameter, the asci 80 to 95 by 6 to 7 μ, and the spores 10 to 14 by 4·5 to 5 (average 11·9 by 4·6) μ. *A. sorghi* n.sp. was found on drooping or dead sorghum

leaves near Batengafo (Northern Ubangui) and in several parts of the Tchad region. The perithecia are 120 to 160 μ in diameter, the asci 58 to 70 by 5·5 to 6·5 μ, and the spores 9·5 to 12 by 3·5 to 4·5 μ.

Coniothyrium sorghi n.sp., found on seeds of red sorghums approaching maturity at Loudima, Middle Congo, and near M'Baïki, has pycnidia measuring 80 to 100 μ in diameter and pycnidiospores 3 to 4 by 2·5 to 3 (average 3·6 by 2·7) μ. The fungus is rather rare and is only of secondary importance as a parasite. *Didymella sorghina* n.sp., found on sorghum leaves collected at Loudima in 1949 and on drooping sorghum leaves near Boukoko in 1952, is regarded as only a secondary parasite; the perithecia measure 180 to 200 μ in diameter, the asci 80 to 95 by 7 to 8 μ, and the ascospores 12 to 14 by 3·5 to 4·5 (average 13·3 by 4·1) μ. *Dinemasporium sorghi* n.sp., found on dead leaves and culms of sorghum near M'Baïki and in several plantations in Tchad, has pycnidia measuring 150 to 250 μ in diameter and 100 to 120 μ high; the conidia are 7 to 9·5 by 2·3 to 3 μ and have appendages 7 to 9 μ long.

Glomerella cingulata var. *sorghicola* n.var., common on dead or dying sorghum stems at Lobaye and in other parts of French Equatorial Africa, has perithecia measuring 200 to 250 by 150 to 180 μ with thick walls, asci measuring 60 to 96 by 12 to 15 (mostly 80 to 85 by 12 to 14) μ, and ascospores 17 to 23·5 by 4·5 to 5·7 (average 20·6 by 5·1) μ. *G. sorghi* n.sp., found on dead sorghum stems near Boukoko, has perithecia measuring 400 to 600 by 200 to 300 μ (the former range including the neck, which measures 150 to 200 by 100 to 130 μ); the asci measure 90 to 135 by 9 to 12 μ and the ascospores 23 to 28 by 6 to 7 (average 26·3 by 6·8) μ. The mycelium of *G. sorghi* penetrates deeply into the stems, disorganizing the invaded cells and obstructing the wood vessels.

Of the other fungi found on sorghum, *Ascochyta sorghina* [*R.A.M.*, 32, p. 90] is widespread on nearly all varieties cultivated in the Tchad region and the northern parts of Ubangui; the losses caused are estimated at 3 to 10 per cent. *Botryodiplodia sorghi* [cf. 18, p. 517] was found by the author on several occasions on living and dead sorghum stems, especially in the forest area of Lobaye and in various parts of Tchad, generally at the end of the growth period. It infects plants already weakened and often develops as a saprophyte. As a parasite it can effect entry only through wounds; it appears to cause only limited damage. *Cercospora longipes* [loc. cit.] was found on different varieties of sorghum near Logone and Mayo-Kebbi in the Tchad area and at Lobaye. On the whole, it is less common than *C. sorghi* [cf. 32, p. 670] and the damage it causes is less important. In wet areas, however, such as Lobaye, it may appreciably reduce yield by causing leaf withering. *C. sorghi* attacks mainly the leaves, but can equally affect the leaf sheaths and stem tips. It occurs at all stages of growth, especially on plants one month old, and continues to develop during the rainy season. It is most prevalent in wet places near marshes. In 1952 it was frequently observed throughout the whole south-western part of Tchad. At Ba-Illi *C. sorghi* was present on several sorghum collections, and in Ubangui it occurs in the plantings bordering the Bangui-Fort-Archambauet route and in the region of Lobaye.

Colletotrichum graminicola [32, p. 90] causes intense infection of numerous sorghum varieties grown during the wet season in Tchad and Ubangui; almost every planting is affected. In the districts of Léré and Pala attacks on the culms resulted in a complete loss of yield in some plantings, most of the plants failing to form panicles. In other plantings partial or total lodging occurred rather late in the season, which also caused loss of yield. Seed taken from infected plants should be treated with organo-mercury products or copper carbonate.

Curvularia geniculata [cf. loc. cit.; 29, p. 277] was found on several occasions on the panicles, culms, and sheaths of sorghum growing in the wet forest area of Lobaye, usually on sickly or dead plants, on which it was probably saprophytic. It was also frequently present on the panicles in association with *Helminthosporium*

turcicum, *Gibberella zeae* [cf. 32, p. 670], or *G. fujikuroi* [cf. 30, p. 196], more rarely alone where the flowers or young seeds had been destroyed. At Tchad the fungus was found only in a few damp localities near rivers or lakes, always on plants that had almost dried up. Seed disinfection also provides protection against *C. geniculata*. *C. lunata* [18, p. 51; 32, p. 90] is present in French Equatorial Africa on numerous cultivated hosts, including rice, maize, and sugar-cane [cf. 6, p. 144; 23, p. 409]; it was found on the leaves, sheaths, and panicles of sorghum in several wet localities in Tchad and Ubangui.

G. fujikuroi and *G. zeae* were found in profusion on sorghum culms, sheaths, and panicles in the forest area of Lobaye and in parts of Tchad in 1952. Infected material should be burnt.

Gloeocercospora sorghi [32, p. 90] attacks the leaves of different sorghum varieties in Tchad and Ubangui, especially early red- or white-seeded varieties. In North Ubangui the fungus forms numerous spots on the leaves of early varieties, almost the whole leaf surface becoming affected. At Lobaye and Boukoko Station infection is also severe. The fungus is abundant at Ba-Illi Station, in Logone, and in Mayo-Kebbi, especially in the district of Léré; the worst attacks occurred near Moyen-Chari, especially round Fort Archambault. When infection is severe entire leaves dry up prematurely and yield is appreciably reduced. Preventive measures recommended consist in burning all culms and leaves immediately after harvest, refraining from planting sorghum in fields where infected crops have grown, seed disinfection, and the use of resistant varieties.

A further contribution is to follow.

Quilico (A.), Cardani (C.), Piozzi (F.), & Scrivani (P.). **I pigmenti del 'Deuterophoma tracheiphila'.** [The pigments of *Deuterophoma tracheiphila*.]—*R.C. Accad. Lincei*, Ser. VIII, 12, 6, pp. 650–657, 1952. [Received 1953.]

At the General Chemical Institute, Milan, an analytical study was made of the metabolic products and pigments present in the mycelium of strains R (red-albino) and DP (non-chromogenic) of *Deuterophoma tracheiphila* isolated from citrus [*R.A.M.*, 29, p. 464 and next abstract].

Bazzi (B.) & Scrivani (P.). **Un metodo diagnostico per il riconoscimento del decorso del 'mal secco' degli Agrumi.** [A diagnostic method for the observation of the progress of 'mal secco' in Citrus.]—*Phytopath. Z.*, 21, 3, pp. 333–334, 1953.

A method is described from the Società Montecatini, Signa, Florence, Italy, to facilitate observations on the progress of 'mal secco' (*Deuterophoma tracheiphila*) in citrus [cf. *R.A.M.*, 33, p. 350 and preceding abstract]. A few drops of 10 per cent. ammonia, applied to the exposed wood of a decorticated branch after wetting with a plug of cotton soaked in alcohol, cause the infected wood rapidly to turn vivid orange-red, in contrast to the greenish-yellow of the healthy tissue.

DuCharme (E. P.) & Knorr (L. C.). **Vascular pits and pegs associated with diseases in Citrus.**—*Plant Dis. Reptr*, 38, 3, pp. 127–142, 8 figs., 1954. [Multilithed.]

Observations were made in 1947 and 1948 at the Estación Experimental Citrícola, Concordia, Argentina, on the varietal susceptibility of citrus to xyloporosis [*R.A.M.*, 31, p. 181], stem-pitting [31, p. 182], and similar disorders. The 1,509 trees used in the experiment were exposed to field-run insects, including *Aphis citricidus*, *A. spiraecola*, *A. gossypii*, and *Toxoptera aurantii*. Among the diseases present in the immediate vicinity were tristeza, xyloporosis, exocortis [31, p. 382; 33, p. 421], all in commercially destructive amounts, and psorosis [20, p. 105], which was more limited and appeared to be correlated with certain bud-wood

sources. Tables are given showing types and locations of the pitting in (*a*) combinations made by budding a number of rootstock varieties with scions infected with tristeza virus, (*b*) insect-inoculated stock-scion combinations, and (*c*) insect-inoculated combinations of rootstocks approach-grafted with sweet orange scions. Among the more common varieties used as scions, sour orange, Gallego lemon, Sampson tangelo, and Bergamota grossa lime were 100, 100, 88, and 98 per cent. free from pitting, respectively, and the rootstocks sour orange, Pineapple sweet orange and common sweet orange seedling, Nagami kumquat (*Fortunella margarita*), and a hybrid, Calamondin, were 92, 100, 96, 100, and 93 per cent. free, respectively.

Various pitting abnormalities are defined. Conoid pit [cf. 14, p. 162] is characterized by round to oval pits, 0·5 by 2 mm., in the cambial face of the wood, massed at the bud union, into which fit thorn-like projections of the inner bark. In channelling the pits (10 to 60 by 1 to 8 mm.) form shallow, intertwining depressions in the wood, giving it a vermiculated appearance; in twigs they are usually found at the juncture of the flushes; ridges on the bark fit into the depressions [cf. 31, p. 182]. Deltoid pits are elongated (5 to 25 mm. long) parallel to the wood grain and steep-sided, the corresponding pegs being chisel-like. Rugose wood is characterized by elongated, steep-walled pits, 1 to 8 by 1 to 2 mm., resembling channelling. Fluting is expressed in the form of accentuated grain in the wood, consisting of narrow, parallel ridges. In honeycombing the pits occur in the inner face of the bark, while the pegs (less than 1 mm. long) project outwards from the woody cylinder, giving it a faintly fuzzy appearance [cf. 33, p. 347]; both pits and pegs are minute, often escaping casual observation; trees with honeycomb symptoms were also noticeably affected by tristeza.

The results of these investigations indicate that many untried rootstocks may develop pitting troubles. It is emphasized that only tried and proved varieties should be used in commercial practice, new varieties being adopted only after thorough testing.

Knorr (L. C.) & Thompson (W. L.). **Spraying trials for the control of Florida scaly bark in Citrus.**—*Plant Dis. Reptr*, 38, 3, pp. 143–146, 1954. [Multilithed.]

At the Citrus Experiment Station, University of Florida, Lake Alfred, mites of the genus *Brevipalpus* and the Florida scaly bark disease of citrus with which they are associated [*R.A.M.*, 30, p. 465] were both controlled by a single application of wettable sulphur (10 lb. per 100 gals.) just before the spring flush of growth.

Ferwerda (J. D.). **Boron deficiency in Oil Palms in the Kasai region of the Belgian Congo.**—*Nature, Lond.*, 173, 4414, p. 1097, 1954.

A census of oil palms suffering from little leaf in a fertilizer test plot in the Belgian Congo [*R.A.M.*, 32, p. 620], carried out in December, 1953, revealed that 53 per cent. of the palms receiving a complete fertilizer treatment except for boron showed symptoms of the disease, compared with 0 to 6 per cent. on the plots receiving boron or no treatment. It is suggested that little leaf disease is directly related to boron deficiency. Similar symptoms on isolated trees in plots receiving other treatments are considered to result from insect damage.

Franco (C. M.) & Mendes (H. C.). **Deficiência de microelementos em Cafeeiro (nota preliminar).** [Deficiency of trace elements in the Coffee bush (preliminary note).]—*Bol. Suptda Serv. Café, S. Paulo*, 28, 318, pp. 19–22, 1 fig., 1953. [English summary.]

Coffee bushes with small, contorted leaves are widespread in field plantings in São Paulo, Brazil, over 90 per cent. being affected, for instance, at the Central Experiment Station of the Agronomic Institute, Campinas [cf. *R.A.M.*, 31, p. 114].

On 31st October and 7th November, 1952, four groups of 16 plants each were (1) sprayed at the rate of 1·16 l. per plant with a mixture of zinc, manganese, and copper sulphates (237 gm. each), borax (94 gm.), ammonium molybdate (6 gm.), hydrated calcium oxide (263 gm.), and water to make up to 40 l.; (2) supplied with a basic fertilizer alone; (3) sprayed and given the fertilizer; and (4) left untreated. On 15th May, 1953, the numbers of abnormal plants in the four categories were 1, 16, 0, and 15, respectively, indicating that the symptoms are attributable to a shortage of one or more of the trace elements [cf. 33, p. 481].

Borget (M.) & Drouillon (R.). **Le Caféier 'de la Nana', sa place systématique et sa culture particulière.** [The 'de la Nana' Coffee bush, its systematic position and particular culture.]—*Agron. trop., Nogent*, 9, 2, pp. 183–196, 6 figs., 1 map, 1954.

In this account of the 'de la Nana' coffee bush (possibly a variety of *Coffea canephora*) it is stated that the fungi most frequently found on the leaves in the vicinity of Carnot, French Equatorial Africa, are *Cercospora coffeicola*, *Pestalotia coffeae*, *Calostilbella calostilbe* [*Calostilbe striispora*], and various [unspecified] sooty moulds. Foot rot (*Fomes noxius*, *F. lignosus*, and *Armillariella* [*Armillaria*] *mellea*) affects a relatively high percentage of bushes.

Leyendecker (P. J.), Smith (A. L.), Lett (L.), & Lehman (S. G.). **Reduction in yield of Cotton caused by diseases in 1953.**—*Plant Dis. Reptr*, 38, 3, pp. 223–225, 1954. [Multilithed.]

A tabulated summary, based on the estimates from 47 specialists in the cotton belt and compiled by the Cotton Disease Council's Committee on Disease Losses, is given of the reductions in cotton yield due to pests and diseases in 14 States of the United States during the 1953 season [cf. *R.A.M.*, 32, p. 623]. The total loss in bales caused by *Fusarium* wilt (*F. vasinfectum*) amounted to 256,253, *Verticillium* wilt (*V. albo-atrum*) 399,009, bacterial blight (*Xanthomonas malvacearum*) 240,796, root rot (*Phymatotrichum omnivorum*) 149,627, anthracnose (*Glomerella gossypii*) 52,574, seedling diseases (including *Rhizoctonia*) 431,473, *Ascochyta* blight (*A. gossypii*) 14,234, boll rots (*Rhizopus* sp., &c.) 103,842, and non-parasitic diseases, including deficiencies, 578,425 in an aggregate of 2,549,233 bales lost, the total yield being 16,381,000.

Lagière (R.). **Conservation et traitement des semences du Cotonnier. 1.—Synthèse bibliographique.** [Storage and treatment of Cotton seed. 1.—Bibliographical synthesis.]—*Cot. et Fibres trop.*, 8, 2, pp. 201–230, 1 graph, 1953.

This useful summary of information on the storage and fungicidal treatment of cotton seed is based on 50 contributions to the literature.

Knight (R. L.). **Breeding Sudan Cottons.**—*Emp. Cott. Gr. Rev.*, 31, 1, pp. 1–11, 1954.

In this paper, the Presidential Address delivered before the Philosophical Society of the Sudan on 11th December, 1952, the author reviews the history of cotton-breeding in the Sudan, including the development of varieties resistant to blackarm [*Xanthomonas malvacearum*: *R.A.M.*, 32, p. 431; 33, p. 481, and next abstract] and leaf curl virus [33, p. 422].

Knight (R. L.). **Cotton breeding in the Sudan. Part 1. Egyptian cotton.**—*Emp. J. exp. Agric.*, 22, 85, pp. 68–80, 1954.

Following a brief introduction on the position of cotton production in the economy of the Sudan, the author deals with Egyptian cotton, the cardinal

requirements for the crop, and the breeding of disease-resistant and highly productive varieties, with special reference to blackarm (*Xanthomonas malvacearum*) and leaf curl virus [see preceding abstract]. Much of the information (with 26 references) has been noticed from time to time in this *Review*.

Juniper (A. J.). **Some predacious fungi occurring in dung.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 356–361, 1 pl., 4 figs., 1953.

Descriptions are given of the following predators of amoebae isolated from animal dung in Essex [cf. *R.A.M.*, 32, p. 313]: *Acaulopage acanthospora* var. *magna* n.var., *A. stenospora* [20, p. 462], both new records for Britain, *Stylopage rhynchospora* [30, p. 466], and *S. lepte* [14, p. 508]; also *Acrostalagmus gonioides* [22, p. 136] (a new record) and *Arthrobotrys oligospora* [33, p. 352] which capture nematodes.

Hutchinson (S. A.) & Mai (W. F.). **A study of the efficiency of the catching organs of Dactylaria eudermata (Drechs.) in relation to Heterodera rostochiensis (Wr.) in soil.**—*Plant Dis. Reptr*, 38, 3, pp. 185–186, 1954. [Multilithed.]

In laboratory experiments at the Department of Plant Pathology, New York State College of Agriculture, Cornell University, *Dactylaria eudermata* [*R.A.M.*, 29, p. 304] exerted no control over nematodes (including *Heterodera rostochiensis*) in agar and soil cultures, and did not affect appreciably the numbers of immature females of *H. rostochiensis* developing on potato roots. It is suggested that more extensive field trials with this species for the control of nematode diseases of plants would be unprofitable.

Anselme (C.). **La maladie du pasmo des Lins à huile en France.** [The pasmo disease of Linseed Flax in France.]—*Phytiatrie-Phytopharm., 1952*, 3, 4 pp., 1952. [Abs. in *Z. PflKrankh.*, 61, 4, p. 219, 1954.]

The presence of *Septoria linicola* [*Mycosphaerella linorum*] on linseed flax was demonstrated in 1947 in Morocco and in 1950 in France [C.M.I. map No. 18]. Certain fibre varieties also proved susceptible in inoculation experiments. Seed treatment is only partially successful and control measures should also include a four-year rotation and a ban on the use of seed from infected fields, traffic in seed from contaminated areas, and the cultivation of fibre varieties in proximity to linseed.

Baker (K. F.), Matkin (O. A.), & Davis (Lily H.). **Interaction of salinity injury, leaf age, fungicide application, climate, and Botrytis cinerea in a disease complex of Column Stock.**—*Phytopathology*, 44, 1, pp. 39–42, 2 figs., 1954.

A disease complex in field-grown stocks (*Matthiola incana*) caused heavy losses during the winter of 1952–3 in coastal areas of southern California, destroying half the crop in some districts. The sequence began with a foliar tipburn due to the accumulation of soluble salts through evaporation of guttation drops. This provided a favourable means of infection and passage into the main stem for *Botrytis cinerea* under cool, moist conditions, with resultant destruction of the inflorescence. The incidence of leaf and flower decay can be reduced by fungicidal treatment, e.g., with captan, zineb, or manzate, which should be discontinued, however, when the flowers begin to open, since the foliage is no longer susceptible at this stage and further applications tend to cause premature withering and ageing of the petals. Flowers cut in this condition were severely damaged by *B. cinerea* in transit and storage.

Plakidas (A. G.). **Transmission of leaf and flower variegation in Camellias by grafting.**—*Phytopathology*, 44, 1, pp. 14–18, 2 figs., 1954.

At the Department of Botany, Louisiana State University, leaf and flower

variegation was transmitted by grafting from *Camellia japonica* to 16 uniformly green varieties and two seedlings of the same species and to two varieties of *C. sasanqua* (the common commercial rootstock), and from the latter to both species. Presumably, therefore, the condition is due to a virus [cf. *R.A.M.*, 31, p. 329] or other infectious entity. In the grafts (made in 1951 and 1952) that have already flowered, floral colour breaking was transmitted in nine separate grafts to seven different varieties. Leaf variegation has so far developed in 15 out of 35 further graft combinations made in 1953.

Simpson (C. F.) & West (E.). **Ergot poisoning in cattle.**—*Circ. Fla agric. Exp. Sta.* S-43, 6 pp., 2 figs., 1952. [Received December, 1953.]

Ergot poisoning in Florida cattle is caused by *Claviceps paspali* on Argentine Bahia grass (*Paspalum notatum*) [*R.A.M.*, 33, p. 102], Dallis grass (*P. dilatatum*), and *P. plicatulum*. Sclerotial development is prevented during the rainy season by the hyperparasites *Fusarium* sp. and *Cerebella* sp., but may occur later in the summer, when these fungi are no longer active. Poisoning is prevented by mowing off the affected seed-heads. Hay cut from ergot-infested fields is innocuous, few sclerotia being retained.

Armstrong (G. M.) & Armstrong (Joanne K.). **Alfalfa—a common host for the wilt Fusaria from Alfalfa, Cotton, and Cassia.**—*Plant Dis. Reptr*, 38, 3, pp. 221–222, 1954. [Multilithed.]

As a result of cross-inoculation experiments in the greenhouse at South Carolina Agricultural Experiment Station it was found that lucerne wilt could be caused by three forms of *Fusarium* isolated from lucerne [*R.A.M.*, 30, p. 374], cotton [*F.* ? *vasinfectum*: 22, p. 65], and *Cassia tora* [loc. cit.], respectively, in the United States. The strains differed in pathogenicity and the one from *Cassia* appears to be undescribed. Pot and field tests carried out in 1951 and 1952 indicate that the cotton wilt *Fusarium* can be an important factor in depleting lucerne stands [32, p. 485].

Ramsfjell (T.). **Lærsopper og poresopper på frukttrær og bærbusker.** [Leather fungi and pore fungi on fruit trees and small fruits.]—*Frukt og Bær, 1954*, pp. 81–96, 17 figs., 1954.

This is an annotated list of the species of *Stereum* and Polyporaceae occurring on fruit trees and bush fruits in Norway, supplemented by a key for their determination. In addition to the parasites already listed by Jørstad [*R.A.M.*, 28, p. 336], *Stereum sanguinolentum*, the agent of a severe top rot of firs [*Abies* spp.], has been observed once on plum.

Andrén (F.). **Besprutningsförsök mot Äppleskorv och Äpplemjöldagg 1953.** [Spraying experiments against Apple scab and Apple mildew 1953.]—*Växtskyddsnotiser, Stockh., 1953*, 5–6, pp. 82–84, 1953.

In the Malar district of Sweden during 1953 SR 406 [captan], applied at a concentration of 0·5 per cent. on 6th May and at 0·25 per cent. on 10th and 30th June, 31st July, and 28th August reduced the incidence of apple scab [*Venturia inaequalis*: *R.A.M.*, 32, p. 89] on the Oranie variety from 52 to 4·7 per cent. and on Alexander from 36 to 2·9. The corresponding levels for Bordeaux mixture (0·8–1·6–100 for the first treatment and 0·5–1–100 for the subsequent ones) were 7·1 and 6·6 per cent.; the copper-sensitive Oranie developed severe russeting. Reasonably good results were also obtained with rodan nitrobenzol, zineb, and ziram.

Two schedules were used for the Signe Tillisch variety, which was sprayed seven times between 16th April and 12th September. In (1) the first spray consisted of

a 0·6 per cent. copper ammonium preparation, the second of 0·4 per cent. sulphur plus 0·1 per cent. ferbam, the third of 0·1 per cent. ferbam, and the remaining four of 0·1 per cent. zineb. In (2) Bordeaux mixture was used for the first three applications at concentrations of 2–1–100, 0·8–1·6–100, and 0·5–1–100, respectively, 0·4 per cent. sulphur for the fourth, 0·1 per cent. zineb for the fifth and sixth, and Bordeaux 0·5–1–100 for the seventh. These two schedules produced, respectively, 74·4 and 65 per cent. scab-free fruits, while on the rest infection was not unduly severe. On the untreated trees only 1·9 per cent. of the fruits were sound and 77·7 per cent. were heavily infected.

Promising results were given in a few tests against apple mildew [*Podospheara leucotricha*], which has become progressively more troublesome of late years, by 0·4 to 0·6 per cent. sulphur spray at the rate of 50 gm. per l., with an adhesive.

Fritzsche (R.), Kundert (J.), & Bieri (F.). **Einiges zur Spritztechnik im Obstbau.** [Something about spraying technique in fruit cultivation.]—*Schweiz. Z. Obst- u. Weinb.*, 63, 8, pp. 151–163, 4 figs., 1 diag., 1 graph, 1954.

Some possibilities of enhancing the efficiency of apple scab [*Venturia inaequalis*] control in Swiss orchards [*R.A.M.*, 33, p. 432] are discussed. Increasing the pressure of the spraying machine, e.g., from 10 to 20, 30, or 40 atmospheres, and attention to correct adjustment between the number of piston strokes, nozzle size, and the pressure are suggested.

Jamalainen (E. A.). **Suomessa viljetyjen Omenalajikkeiden säilyvyydestä varastossa.** [The keeping qualities of Apple varieties cultivated in Finland.]—*Maataloust. Aikakausk.*, 25, pp. 136–146, 2 figs., 1953. [English summary.]

Preliminary studies on the keeping qualities of six of the leading apple varieties cultivated in Finland were carried out during the storage period of 1952–3 at the Department of Plant Pathology, Tikkurila, and two other centres, at temperatures of 2·9°, 4°, and 3·5° C. corresponding to relative humidities of 77, 88, and 95 per cent., respectively. The apples were packed in boxes (each containing 150), placed in storage at the beginning of October, and examined on 11th November, 19th December, 27th January, 8th March, and 18th April.

Åkerö, Antonovka, and Linda were the best keepers, while the autumn variety Punainen Kaneli [Red Cinnamon] was unmarketable as early as November and Wealthy and Lobo by early March on account of brown heart (over-ripeness). *Gloeosporium album* was the most important cause of fungal rot [cf. *R.A.M.*, 31, p. 560] during the later stages of the investigation, especially in the ordinary ventilated storehouse with the maximum relative humidity; Wealthy sustained the heaviest damage (up to 80·1 per cent.). Åkerö was infected by *Fusarium avenaceum* (maximum 5·4 per cent.), while traces of blue mould (*Penicillium* sp.) were noted on four varieties and of *Sclerotinia fructigena* on one. Scald and Jonathan spot [cf. 31, p. 66; 33, p. 360] were relatively insignificant, the former occurring at room temperature and the latter chiefly in over-mature or rotten fruits.

Akaishi (Y.) & Sekiguchi (A.). **Studies on the control of Apple violet root-rot caused by Helicobasidium mompa Tanaka. I. Isolation of pathogen and its antagonists.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 129–132, 1953. [Japanese, with English summary. Received April, 1954.]

In the course of isolating *Helicobasidium mompa* [*R.A.M.*, 30, p. 337] from apple in Japan in 1952 five lines of micro-organisms were selected which showed marked antagonism to the fungus. *Actinomyces* sp. was the most active.

Ark (P. A.). **Some important sources of crown gall bacteria in California orchards.** —*Plant Dis. Reptr*, 38, 3, pp. 207–208, 1 fig., 1954. [Multilithed.]

Crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) constitutes a serious problem in many peach, almond, and prune orchards in California [*R.A.M.*, 33, p. 36]. In a recently replanted prune orchard volunteer myrobalan [*Prunus cerasifera*] 29C plants were found, bearing many large galls at the cut places on the roots and stems damaged by the disk or plough; the plants had developed from root pieces buried for six months after removal of the old infected trees. These infection sources are a serious threat to young orchards and may render the elimination of the disease practically impossible. Preventive measures include the more thorough removal of all the remaining roots and cropping for several years with resistant plants before replanting.

Ostojić (N.). **Die Sărka, eine gefährliche Viruskrankheit der Zwetschgenbäume in Jugoslavien.** [Plum pox, a formidable virus disease of Plum trees in Yugoslavia.]—*Schweiz. Z. Obst- u. Weinb.*, 62, 12, pp. 225–227, 1 fig., 1953.

The author describes the spread of plum pox disease in Jugoslavia [*R.A.M.*, 33, p. 304] and outlines methods of control [loc. cit.].

Van der Meer (F. A.). **De incubatie-tijd van de dwergziekte bij verschillende Frambozenrassen.** [The incubation period of the dwarf disease in different Raspberry varieties.]—*Tijdschr. PlZiekt.*, 60, 1, pp. 69–71, 1954. [English summary.]

Extensive field observations in the Breda district of Holland showed that the first symptoms of *Rubus* stunt virus [*R.A.M.*, 32, p. 683] in the most widely cultivated variety, Radboud, do not appear until the summer and autumn of the second year after the planting of healthy stock. However, in grafting experiments in an unheated greenhouse from 1951 to 1953 with infective material from Radboud and Gertrudis, Norfolk Giant and Radboud developed stunt symptoms in four months, whereas Lloyd George, Malling Promise, and Taylor were still healthy a year after inoculation.

Powell (D.). **The effect of captan on grey mould rot incidence and yield of Strawberry.**—*Plant Dis. Reptr*, 38, 3, pp. 209–211, 1 graph, 1954. [Multilithed.]

At the Department of Horticulture, Division of Plant Pathology, University of Illinois, Urbana, five applications of 50 per cent. captan (5 to 7 lb. per acre; 8 lb. per 100 gals. spray) to Blackmore strawberry plants at six to ten-day intervals, starting at early bloom, reduced grey mould (*Botrytis cinerea*) [*R.A.M.*, 32, p. 87] by 75 per cent. on the flowers and fruit, delayed the development of post-harvest rot, and increased the yield from 109 to 193 crates per acre.

Fulton (J. P.). **Heat treatment of virus-infected Strawberry plants.**—*Plant Dis. Reptr*, 38, 3, pp. 147–149, 3 figs., 1954. [Multilithed.]

In experiments at Arkansas Agricultural Experiment Station on the inactivation of strawberry viruses by heat [cf. *R.A.M.*, 33, p. 306] Blakemore plants from a single clone infected with virus types 1 and 2 [31, p. 288] were conditioned for several weeks at 27° C. and then subjected for three months during the summer of 1952 to temperatures fluctuating between 31° and 48° in daylight in a plastic-covered chamber in the greenhouse. When indexed on a clone obtained from a cross between the East Malling strain and an alpine variety (Baron Solemacher) of *Fragaria vesca*, most treated plants transmitted milder symptoms than the non-treated. From one treated plant a clone was obtained which remained virus-free during 14 months of repeated indexing.

Ginsburg (L.). **The storage quality of Queen Pineapples.**—*Fmg in S. Afr.*, 28, 333, pp. 430–432, 1 fig., 1953. [Received February, 1954.]

Large quantities of waterlogged pineapples (exuding juice freely when cut) are exported annually from South Africa to England. In an experiment two typical shipments of Queen pineapples, one with 144 sound fruits and the other with 97, of which a high percentage were waterlogged, were kept for 26 days at 48° F., the normal shipping temperature. In the first consignment only one fruit was bruised, four were slightly waterlogged, and four others were slightly sunburnt; after 13 days at a post-storage temperature of 50° F. the fruit was over-ripe but still palatable. In the second consignment the fruits appeared normal after the first 26 days except for a slight dullness in 40 per cent. From these fruits the juice exuded freely when cut and had a watery, sweet, or even musty flavour. After 5 days at 50° every fruit except one was dull and water-soaked. Of 16 cut, 15 were severely waterlogged and three had lesions in the affected tissue near the butt end. After 10 days the fruit was moist and sticky with a marked development of surface mould. None was of any commercial value and only seven remained sound. Microscopical examination revealed that the juice had passed from the cells to the intercellular spaces in waterlogged fruit. Only a trace of ascorbic acid was present after 26 days at 48° and 4 at 50°.

The condition is considered to result from a physiological breakdown of fruits, particularly from young pineries, and constitutes a ground for rejection for export.

The Mango.—121+11 pp., 23 pl. (6 col.), 1 fig., The Department of Agriculture, Hyderabad, [? 1953]. Rs. 3.

In chapter 18 of this publication to stimulate interest in the mango in the State of Hyderabad, Dr. [S.] Vaheeduddin (pp. 82–85) briefly describes and illustrates the main diseases of the tree in that area. Of major importance are powdery mildew (*Oidium mangiferae*) [*R.A.M.*, 32, p. 472] and anthracnose (*Colletotrichum gloeosporioides*) [*Glomerella cingulata*: cf. 31, p. 443]. The symptoms and control of these diseases are outlined, together with those of the less economically important die-back (*Fusarium* spp.) [26, p. 205], *Erwinia mangiferae* [cf. 29, p. 89], sooty mould (*Capnodium mangiferum*), *Lasiodiplodia* sp., and mango [bunchy top] virus [32, p. 325].

Ark (P. A.) & Sibray (W. S.). **Use of panogen drench to control damping-off in nursery flats.**—*Plant Dis. Reptr*, 38, 3, pp. 204–206, 2 figs., 1954. [Multilithed.]

In experiments carried out conjointly by the Department of Plant Pathology, University of California, Berkeley, and the Alameda County Department of Agriculture, California, a 1:10,000 solution of panogen used as a soil drench in nursery flats was effective against damping-off (*Rhizoctonia* [*Corticium*] *solani* and *Pythium ultimum*) of many common species of ornamentals and vegetables and was non-phytotoxic. Treated flats can be seeded after 24 hours.

Adams (D. A. W.) & Smith (T. S.). **Organic insecticides and fungicides and their manufacture.**—*Chem. Prod.*, 17, 1, pp. 3–7, 1954.

The brief concluding section in this review of recent developments in the plant-protective field is concerned with the manufacture of fungicides based on aromatic organic compounds, with special reference to the production in Germany between 1939 and 1945 of chloronitrobenzenes, especially pentachloronitrobenzene, which is still in fairly extensive use as a soil disinfectant and for the control of wheat bunt [*Tilletia* spp.].

Byrde (R. J. W.) & Woodcock (D.). **Fungicidal activity and chemical constitution. II. Compounds related to 2:3-dichloro-1:4-naphthaquinone.**—*Ann. appl. Biol.*, 40, 4, pp. 675–687, 3 graphs, 1953.

In this second paper of the present series (part one of which is represented by 'Studies on systemic fungicides. III' [*R.A.M.*, 33, p. 101]) the authors describe in detail experiments carried out at Long Ashton Research Station in which 2:3 dichloro-1:4-naphthahydroquinone and a number of derivatives were tested in aqueous acetone solution against *Sclerotinia laxa*, *Botrytis fabae*, *Cladosporium fulvum*, and *Venturia inaequalis* by means of a spore germination technique. A preliminary account of this work has already appeared [31, p. 290]. A relationship between ease of hydrolysis and fungicidal activity was apparent in the dibenzoyl, dimethyl ether, and diacetyl esters, and it is suggested that these compounds, though not inherently active, are, like the parent compound, hydrolysed in the presence of a fungal esterase.

Veenenbos (J. A. J.). **Zaaizaadontsmetting.** [Disinfection of seed for sowing.]—*Landbouwvoorlichting*, 11, 2, pp. 65–66, 1954.

Recent advances in seed treatment are outlined, with special reference to the chemical composition and uses of fungicides containing thiram or quinones [see preceding abstract], which have proved superior to organic mercurials in the protection of maize, peas, beans [*Phaseolus vulgaris*], and flax against soil-borne fungi.

Baumann (G.). **Möglichkeiten und Methoden der Heilung von Pflanzenkrankheiten durch Wärmeeinwirkung.** [Possibilities and methods for the cure of plant diseases by the action of heat.]—*Dtsch. Landw.*, 5, 2, pp. 76–80, 1954.

From a study of the literature (43 references) the author has compiled a useful summary of the existing position in Germany and abroad as regards the use of various methods of heat treatment for plant disease control.

Ciferri (R.). **Verso un'endoterapia delle piante.** [Towards an endotherapy of plants.]—*Notiz. Malatt. Piante*, 24–25, (N.S. 3–4, *1954*), pp. 43–53, 1954.

In this paper, read at the second convention of the Società italiana di Fitoiatria, held at Parma in September, 1953, the author defines 'endotherapy' (chemotherapy) [cf. *R.A.M.*, 23, p. 367; 32, p. 27; 33, p. 67; *et passim*], discusses the advantages and disadvantages of the method, and briefly reviews the chief contributions made to the subject [all of which have been noticed in this *Review*]. It is concluded that at present too little is known about the various factors which may affect the results obtained for any recommendations to be made for the practical application of endotherapeutic methods.

Goossen (H.). **Welche biologischen Forderungen werden an Pflanzenschutzgeräte für den Feldbau gestellt?** [What are the biological requirements in plant-protective apparatus for agriculture?]—*Z. PflKrankh.*, 60, 11, pp. 561–568, 1953. [English summary.]

From personal experience at the Münster Plant Protection Station, Westphalia, Germany, and published information the author has reached the following conclusions regarding the quantities of water necessary for the effective application of insecticides, fungicides, and herbicides. In general, a machine should be able to deliver any quantity between 100 and 800 l. spray mixture per ha. in large (exceeding 200 μ) as well as small (100 μ) droplets. The only fungicide considered in the paper is Bordeaux mixture for the control of *Phytophthora* [*infestans*] on potato

[*R.A.M.*, 33, p. 206]. For this purpose a mist blower proved superior to various types of spray equipment, but adequate coverage of the lower surfaces of the leaves was not achieved by any of the machines tested.

Amtliches Pflanzenschutzmittelverzeichnis und Pflanzenschutzgeräteverzeichnis 1954 der Bundesanstalt für Pflanzenschutz, Wien. [Official list of plant protectives and plant protection equipment 1954 of the Federal Institute for Plant Protection, Vienna.]—*Pflanzenarzt*, 7, *Suppl.* 1, 22 pp., 1954.

Lists are given, *inter alia*, of the fungicides, combined insecticides and fungicides, adjuvants of various kinds, and plant protection equipment officially approved for use in Austria during 1954 [cf. *R.A.M.*, 32, p. 491], together with brief directions for their application, and a list of firms supplying these requirements.

Gregory (P. H.) & Stedman (O. J.). **Deposition of air-borne Lycopodium spores on plane surfaces.**—*Ann. appl. Biol.*, 40, 4, pp. 651–674, 10 graphs, 2 diags., 1953.

In further investigations at Rothamsted Experimental Station the deposition of *Lycopodium* spores on sticky surface traps as used in routine aerobiological survey was studied in a small wind tunnel at wind speeds ranging from 0·5 to 9·5 m. per sec., approximately [*R.A.M.*, 33, pp. 41, 408].

The pattern of deposit on a microscope slide at angles varying from 0° to 90° to the wind, gravity being positive, neutral, or negative, indicated that except on a surface parallel to the wind at the lowest wind speed sedimentation under gravity plays a minor part in deposition. As the wind speed increases the deposit decreases, because of 'edge shadow'. At the greatest wind speed the deposit on a horizontal slide is as great on the lower as on the upper surface, which suggests deposition by turbulence. Deposition by impaction against a vertical strip increases with wind speed, efficiencies being lower than for cylinders of the same diameter [31, p. 251]. The deposit on slides inclined at angles of 45° or less to the wind direction is increased by impaction of an 'edge drift'. The interaction of these processes on mean deposition at different angles and wind speeds gives a series of curves with a maximum at 90° at 9·5 m. per sec. and minima at 0°, 90°, and 180° at lower wind speeds. At the lower wind speeds there are two maxima in the ranges 20° to 70° and 135° to 150°, respectively. Deposits on Petri dishes display rim effects that differ with different wind speeds, but which can be eliminated by sinking the dish below a flat surface. Blow-off from non-sticky surfaces was ascertained to be least at about 45° and greatest at 0°.

Isaac (I.). **Studies in the interactions between species of Verticillium.**—*Ann. appl. Biol.*, 40, 4, pp. 623–629, 1 fig., 1953.

Studies at University College, Swansea, demonstrated that *Verticillium albo-atrum*, *V. dahliae*, *V. nigrescens*, *V. tricorpus*, and *V. nubilum* [*R.A.M.*, 33, p. 185 and next abstract] developed together on agar media or wheat grains without mutual antagonism. When, however, a mixed spore suspension of the same fungi was injected into the stems of 8- to 10-week-old antirrhinum and tomato seedlings, suppression of *V. tricorpus*, *V. nigrescens*, and *V. nubilum* by either one or other of the remaining two invariably resulted. *V. albo-atrum* and *V. dahliae* could not be recovered from soil six months after inoculation by means of infected wheat grains, though the other three were isolated after 12 months.

It is concluded that *V. albo-atrum* and *V. dahliae* are 'root-inhabiting' fungi [29, p. 420], *V. nigrescens* and *V. nubilum* are 'soil-inhabiting', and *V. tricorpus* may be regarded as intermediate, because although pathogenic it may exist as a saprophyte for a relatively long time in the soil in the form of mycelium or conidia.

Isaac (I.). **The spread of diseases caused by species of Verticillium.**—*Ann. appl. Biol.*, 40, 4, pp. 630–638, 3 diags., 1953.

In an investigation at University College, Swansea, it was ascertained that *Verticillium albo-atrum* and *V. dahliae* [see preceding abstract] spread rapidly among tomato and antirrhinum plants by root contact, though *V. tricorpus*, *V. nigrescens*, and *V. nubilum* [loc. cit.] made no appreciable spread even after two seasons. Whenever the inoculated tomato and antirrhinum plants wilted and died the causal organism could be isolated from the soil near the roots of the dead plants, but when the inoculated host harboured a species without displaying disease symptoms, as in the case of *V. tricorpus* and *V. nubilum* in antirrhinum, the parasite was never found in the soil. Further, *V. tricorpus* and *V. nubilum* in antirrhinum and *V. nigrescens* and *V. nubilum* in tomato are, apparently, mild pathogens, since after they had already become established *V. albo-atrum* entered and parasitized both hosts, inducing its own disease symptoms.

Spread through the soil in the absence of hosts was tested by inserting infected wheat grains into soil and later attempting to isolate the fungi at various distances from the point of inoculation. *V. albo-atrum*, *V. dahliae*, and *V. tricorpus* remained confined to the immediate neighbourhood of the infected grains, but *V. nubilum* and *V. nigrescens* could be isolated within approximately $1\frac{1}{2}$ and $2\frac{1}{2}$ in., respectively, from the centre of infection; in no instance, however, did they attain sufficient concentration to cause appreciable infection of tomatoes planted subsequently.

As *V. albo-atrum* and *V. dahliae* are mainly responsible for the *Verticillium* wilts of tomato and antirrhinum, the rapid spread of these diseases from an infected plant must be due, not to the growth of fungal mycelium in the soil towards new hosts, but to the growth of the roots into infested soil round the initially diseased plant. Since such soil infection is brought about by the release of the pathogen on the breakdown of the affected roots, the more rapid the fatal effect of the pathogen on the host the more widespread will be the incidence of disease. When the parasite is not fatal to the host, as in the case of *V. tricorpus* or *V. nubilum* on antirrhinum, no apparent infection of the neighbouring soil results, and therefore no spread of the disease follows.

Petrik (A.). **Der Pflanzenschutz in Jugoslavien.** [Plant protection in Yugoslavia.] —*Pflanzenschutz*, 5, 2, pp. 20–25, 4 figs., 1 map, 1953.

Among the pathogens to be investigated by the plant protection service of Yugoslavia are *Bacillus* [*Erwinia*] *bussei* [*R.A.M.*, 13, p. 210] and *Cercospora beticola* on sugar beet, *Phytophthora infestans* and *Alternaria solani* on potato, *Pseudomonas tabacum* on tobacco, and *Bacterium* [*Xanthomonas*] *malvacearum* and *Macrosporium* '*nigricantium*' [*M. nigricans*, perhaps a *Stemphylium*: 9, p. 32] on cotton.

Pramer (D.). **Observations on the uptake and translocation of five actinomycete antibiotics by Cucumber seedlings.**—*Ann. appl. Biol.*, 40, 4, pp. 617–622, 1 pl., 1 graph, 1953.

In qualitative and quantitative studies carried out at the Butterwick Research Laboratories, Welwyn, Herts., on the uptake and translocation of antibiotics by cucumber seedlings (Bedfordshire Prize Ridge), chloromycetin [chloramphenicol] and streptomycin sulphate were absorbed from nutrient solution by the roots and translocated to the leaves. The streptomycin concentration in leaf tissue increased with time to a level above that in the nutrient solution, whereas the chloramphenicol concentration tended to remain constant at a level below that in the nutrient. No convincing evidence of the uptake or translocation of aureomycin hydrochloride, neomycin sulphate, or terramycin hydrochloride was obtained.

Anderson (R. F.), Whitmore (L. M.), Brown (W. E.), Peterson (W. H.), Churchill (B. W.), Roegner (F. R.), Campbell (T. H.), Backus (M. P.), & Stauffer (J. F.). **Penicillin production by pigment-free molds.**—*Industr. Engng Chem.*, 45, 4, pp. 768–773, 2 diags., 5 graphs, 1953.

At the University of Wisconsin, a pigmentless mutant of *Penicillium chrysogenum* Q 176 [*R.A.M.*, 25, p. 307] was obtained by spore treatment with ultraviolet radiation. By a process of selection and further mutagenic treatment a family of several thousand pigment-free isolates was derived. Of six strains chosen for further investigation, mainly on the basis of superior penicillin production, the best (49–133) yielded nearly twice as much of the antibiotic as the widely used Q 176, roughly 90 per cent. of the product being penicillin G.

Williams (A. E.). **Preservation of paints.**—*Industr. Finish.*, 6, 67, pp. 434–436, 1954.

Useful information is presented on the preservation of various types of paints, lacquers, and varnishes against [unspecified] moulds [*R.A.M.*, 33, p. 168] by santophan 20 (pentachlorophenol) and santobrite (sodium pentachlorophenate) [30, p. 336], both manufactured by Monsanto Chemicals. The latter is readily soluble in water at the rate of 2 lb. per gal., but the former requires an organic solvent, e.g., methanol, diethyl ether, or butyl carbitol in which 65·6, 60·3, and 57 per cent., respectively, of the chemical (by weight) is dissolved at 30° C. Both preservatives are relatively inert and very stable, withstanding exposure to temperatures up to 300°, non-corrosive to metals, and comparatively non-toxic.

Boneh (Shira). **Contribution to the knowledge of some textile destroying fungi in Israel.**—*Palest. J. Bot.*, J. Ser., 6, 2, pp. 107–113, 5 figs., 1953. [Hebrew summary.]

Studies at the Department of Botany, Hebrew University, Jerusalem, on the biology and physiology of the following fungi damaging tent fabrics in Israel [*R.A.M.*, 30, p. 528], *Penicillium* sp., *Trichoderma lignorum* [*T. viride*], *Stemphylium verruculosum*, *Alternaria tenuis*, *Stachybotrys atra*, *Memnoniella echinata*, *Chaetomium spirale*, *C. murorum*, *C. pannosum*, and *C. erectum* clearly showed that the *C. spp.* actively decomposed cellulose [32, p. 94; 33, p. 60], causing more damage to cotton fibres than any of the other fungi tested. Decomposition proceeds from the inside outwards, only fungi that penetrated the lumen being able to decompose the fibres.

In tests on various soils well manured ones caused most decomposition and sand the least. At high concentrations copper adversely affected the formation of reproductive organs of *T. viride*, *S. atra*, *M. echinata*, and *C. spirale*.

Cooke (T. F.). **Resistance to microbiological deterioration of resin-treated cellulosic fabrics.**—*Text. Res. J.*, 24, 3, pp. 197–209, 4 figs., 5 diags., 1 graph, 1954.

Textile resins of the water-soluble, aminoplast type have been shown to prevent the microbiological deterioration of cellulosic fabrics. The subject is discussed in the light of 50 contributions to the literature under the following headings: structure of cellulosic fibres, micro-organisms that deteriorate cellulose, fungicides and bactericides, chemical reactions with cellulose, water-soluble aminoplast textile resins, and proposed mechanism of resistance of textile resin-finished fabrics to degradation by micro-organisms.

Simon (S. A.) & Harmon (C.). **Color in Cotton.**—*Text. Res. J.*, 24, 1, pp. 12–16, 1 fig., 7 graphs, 1954.

At the Chicopee Manufacturing Corporation, Chicopee, Massachusetts, the writers confirmed the findings of Marsh and Bollenbacher [*R.A.M.*, 28, p. 584 and

next abstract] that the dark colour persisting in cotton after bleaching is associated with the presence of *Cladosporium* spp. [including *C. herbarum*], *Alternaria* sp., and *Fusarium moniliforme* [*Gibberella fujikuroi*], notably the first-named.

Marsh (P. B.), Bollenbacher (K[atherina]), Butler (M. L.), & Merola (G. V.). **The relative responsiveness of certain properties of Cotton fiber to microbial action.**—*Text. Res. J.*, 24, 1, pp. 31–38, 1 fig., 1 graph, 1954.

In further studies at the Bureau of Plant Industry, Beltsville, Maryland, on the effects of microbiological action on cotton fibre, inoculation with *Cladosporium herbarum* and incubation for periods up to 28 days in a saturated atmosphere resulted in measurable and visible darkening [see preceding abstract]. Absorption of the direct dye chlorantine fast green by fibre inoculated with *C. herbarum* and mercerized before dyeing increased markedly as the incubation period proceeded.

Hofsten (B. v.), Hofsten (Angelica v.), & Fries (N.). **Continuous liquid culture of the fungus Ophiostoma multiannulatum.**—*Exp. Cell Res.*, 5, 2, pp. 530–535, 2 figs., 1 graph, 1953.

At the Institute of Physiological Botany, University of Uppsala, Sweden, *Ophiostoma multiannulatum* [*Ceratostomella multiannulata*] has been kept in continuous culture for some months by Monod's technique (*Ann. Inst. Pasteur*, 79, p. 390, 1950), with certain modifications involving, for instance, the use of a specially designed peristaltic pump to transport the medium at a constant rate from the storage bottle to the culture flask, at a speed of about 150 revolutions per minute, and maintenance at a temperature of 30° C. instead of 25°. The growth rate of the organism can be controlled by varying the intervals at which fresh nutrient is added to the culture.

In some respects *C. multiannulata* presents obvious advantages as an object of study over the bacteria to which similar methods have hitherto been applied. For example, its cells are easier to manipulate and the yield is much heavier, while as a heterothallic organism it is better adapted to genetic analysis [cf. *R.A.M.*, 32, p. 498].

Purdy (L. H.) & Grogan (R. G.). **Physiological studies of Sclerotinia sclerotiorum in liquid and agar culture.**—*Phytopathology*, 44, 1, pp. 36–38, 2 figs., 1954.

The experiments herein reported from the Department of Plant Pathology, University of California, Davis, were undertaken to investigate the conflicting results of Newton [*R.A.M.*, 26, p. 74] on the one hand and of Tanrikut and Vaughan [31, p. 292] on the other regarding the nutritional requirements of *Sclerotinia sclerotiorum* [32, p. 272]. Clear-cut evidence was obtained of a significant reduction of growth in nutrient solution cultures lacking phosphorus, magnesium, or the trace elements, while little or no development was made in the absence of potassium, nitrogen, or carbon. Agar or other compounds present in it can be utilized by *S. sclerotiorum* and is therefore unsuitable as a medium in physiological studies on the fungus.

Air pollution. Proceedings of the United States Technical Conference on Air Pollution.—xiv+847 pp., 95 figs., 93 diags., 19 graphs, New York, Toronto, London, McGraw-Hill Book Company, Inc., 1952. $12.50. 106*s.* 6*d.* [Mimeoprinted.]

This symposium, sponsored by the Interdepartmental Committee on Air Pollution (1950) under its Chairman, L. McCabe, presents authoritative data on many aspects of the modern problem of air pollution [cf. *R.A.M.*, 31, pp. 291, 570; 33, p. 167], including its effects on plant health. Of the papers submitted to the Agriculture Panel the following may be mentioned. M. D. Thomas, R. H. Hendricks,

& G. R. Hill, in a paper entitled 'Some impurities in the air and their effects on plants' (pp. 41–47), treat of injury by sulphur dioxide and other contaminants, including sulphuric acid aerosols. The latter induce injury only where the leaf surface is wet, since the acid could not wet the surface otherwise. 'Smog' injury [32, p. 478] as affecting vegetation in Los Angeles induces typical sulphur dioxide markings, 'smog' gas markings, and leaf spots [which are described].

L. M. Massey in 'Similarities between disease symptoms and chemically induced injury to plants' (pp. 48–52) stresses the difficulty of accurate diagnosis of chemically induced diseases and the advisability of employing a team of specialists with combined experience in plant diseases, insect pests, cultural practices, nutrition, and the like.

M. Katz & A. W. McCallum in 'The effect of sulphur dioxide on conifers' (pp. 84–96) [32, pp. 47, 394] conclude that these effects are governed by the same concentration-duration-absorption factors as on ornamentals and other plants. Seedlings are more readily affected than older trees. The most susceptible period is in the spring and early summer; the possibility of acute injury in winter is remote. The injury may be 'acute' or 'chronic' but there was no evidence of so-called 'invisible injury', low concentrations being without toxic effects even when prolonged. Air pollution can be controlled by the installation of recovery units for sulphur compounds.

R. H. Daines, Ida Leone, & Eileen Brennan discuss 'The effect of fluorine on plants as determined by soil nutrition and fumigation studies' (pp. 97–105). They conclude that plants may absorb fluorine from both the atmosphere and soil, and analyses of leaves and roots serve to determine the source. Species vary in the minimum concentration capable of inducing injury. Plants growing in optimum conditions with respect to nitrogen, calcium, and phosphorus tend to be more susceptible to fluorine injury from the soil and, to a lesser degree, from the air than plants with unbalanced nutrition. High atmospheric humidity, turgidity of the plant, and wetting of plant surfaces favour injury.

S. W. Griffin & B. B. Bayles in 'Some effects of fluorine fumes on vegetation' (pp. 106–115) describe the results of exposing peach, wild black cherry, apple, Norway spruce, tomato, and maize plants to known concentrations of hydrofluoric acid gas.

V. L. Miller discusses 'The effect of atmospheric fluoride on Washington Agriculture' (pp. 116–122); he found, *inter alia*, a new marginal leaf scorch of Italian prune trees and gladiolus to be due to fluorine effluents. Fluorine scorch of gladiolus may be controlled by means of lime sprays.

P. W. Zimmerman contributes a chapter on 'The effects on plants of impurities associated with air pollution' (pp. 127–139). The impurities discussed include hydrofluoric acid gas, chlorine, hydrogen sulphide, ammonia, and mercury vapour.

Reference has already been made in this *Review* to some of the other subjects, including the scorching of plum and gladiolus foliage and ponderosa pine blight in Washington, both associated with an excess of fluorine in the atmosphere [27, p. 285; 29, p. 466].

Wolf (Elisabeth). **Beitrag zur Systematik der Gattung Mortierella und Mortierella-Arten als Mykorrhizapilze bei Ericaceen.** [A contribution to the taxonomy of the genus *Mortierella* and *Mortierella* species as mycorrhizal fungi of the Ericaceae.]—*Zbl. Bakt.*, Abt. 2, 107, 21–24, pp. 523–548, 21 figs., 1954.

At the Botanical Institute of the University of Würzburg, Germany, the collections of *Mortierella* isolated by Prof. H. Burgeff from high-moorland plants, including *Calluna vulgaris*, *Vaccinium myrtillus*, *V. oxycoccus*, *V. vitis-idaea*, and birch (*Betula pubescens*), were cultured on 4 per cent. malt agar and found to comprise 10 new species and a new variety. Together with Freisleben's fungi

[*Mycelium radicis myrtilli*, *M. r. vitis-idaeae*, and *M. r. uliginosi*: *R.A.M.*, 13, pp. 255, 793] and *Penicillium* spp. [loc. cit.], they were used in synthesizing experiments on *V. myrtillus*, *V. vitis-idaea*, and *V. uliginosum*.

The *P.* spp. promoted the growth of the plants but caused no root infection. Freisleben's fungi formed typical mycorrhiza in the epidermal cells. Some of the *Mortierella* spp. also invaded the epidermis, producing either somewhat coarse, septate hyphae, which expanded into vesicular structures, or fairly thin-walled vesicles. In no case was there a definite deformation of the cell nucleus. Some cells contained fungi in a state of digestion.

Claude (P.). **Les flétrissures végétales d'origine fongique.** [Plant wilts of fungal origin.]—*Rev. Oka*, 36 [26], 2, pp. 46–54, 1952.

In this preliminary contribution to the subject the author deals briefly with the immediate cause of those forms of plant wilting that are due to infection by *Fusarium* spp. He discusses, with numerous references to the literature, the anatomical and physiopathogenic characters of the genus, under the headings of fungal pathogenesis, fungal wilting, the genus *Fusarium*, wilting caused by *F. oxysporum*, and the chief diseases due to *F.* spp. The second part of this instalment deals with the theory that *Fusarium* wilt [cf. *R.A.M.*, 33, pp. 388, 507] is due to nutritional deficiencies in the plant resulting from infection.

Hougas (R. W.) & Krantz (F. A.). **Inter-regional Potato introduction and preservation project.**—*Amer. Potato J.*, 30, 12, pp. 295–297, 1 map, 1953.

The Department of Genetics, University of Wisconsin, Madison, is the headquarters of a project the major objective of which is to promote the improvement of the cultivated potato by providing a readily available reservoir of *Solanum* germ-plasm. The present collection contains approximately 1,400 clonal lines and 360 seed lots, over 45 of the known tuber-bearing *Solanum* species being represented. Stocks of the collection are available to technical workers upon request.

Fernow (K. H.) & Kerr (S. H.). **Leafroll control by use of insecticides.**—*Amer. Potato J.*, 30, 8, pp. 187–196, 1953.

In 1951 tests on leaf roll spread [*R.A.M.*, 31, p. 201; 33, p. 497] were made near Ithaca, New York, with the resistant potato variety Katahdin and the very susceptible variety Chippewa [31, p. 628]. Inoculated plants in infector rows showed 80 per cent. leaf roll and 99 per cent. spindle tuber virus [30, p. 577]. The plots were divided into four blocks, each treated with six applications of four test insecticides and a fixed copper fungicide, starting 10th July and continuing every ten days. Tuber samples were indexed in Florida during the following winter.

The incidence of aphids (following artificial infestation with *Myzus persicae* and natural infection by *Macrosiphum solanifolii* [*M. euphorbiae*]) on 30th August on 56 terminal leaflets from each of the four blocks was as follows: none on plots sprayed with 50 per cent. systox plus 50 per cent. DDT (12 oz. plus 4 lb. per 100 gals. per acre); 26 aphids on plants sprayed with DDT plus 1·5 per cent. parathion (1½ lb.); 684 on those sprayed with DDT alone; and 325 on plants sprayed with fungicide only. The corresponding percentages of leaf roll on Chippewa and Katahdin in the rows next to the infector rows, were, respectively, 5·97 and 0·99, 9·36 and 5·54, 24·41 and 8·17, and 35·8 and 8·98. There was no appreciable spread of spindle tuber.

In 1952 systox was applied every 20 days, other treatments every ten days, in eight sprays starting 24th June. Although aphid populations remained low throughout the year, leaf roll incidence was high. Plant rows of Chippewa and Katahdin

adjacent to the infected rows showed the following percentages, respectively: 28 and 6 on plants treated with systox plus DDT, 19·2 and 7·6 with systox alone, 26·1 and 6 with 15 per cent. parathion plus DDT, 20·4 and 3·2 with parathion alone, 85·6 and 20 with DDT alone, and 66 and 9·6 with fungicide only. Spindle tuber spread extensively in 1952 and reached 5·6 to 12 per cent.; its incidence could not be correlated with any known factor except, possibly, nearness to the inoculum. Whatever vector is involved insecticides had no effect on it.

Most leaf roll spread occurred in rows adjacent to those inoculated, which indicated that wingless aphids were mostly responsible. In rows farther from the inoculum incidence was low. Since systox has not been authorized for food plants, it is recommended that potato seed growers in New York use parathion at frequent intervals throughout the season until the haulms are killed.

Bagnall (R. H.). **The spread of Potato virus Y in seed Potatoes in relation to the date of harvesting and the prevalence of aphids.**—*Canad. J. agric. Sci.* (formerly *Sci. Agric.*), 33, 6, pp. 509–519, 1953.

A brief account of this information on the spread of potato virus Y in plots at Fredericton, New Brunswick, in relation to the aphid population has already been noticed from another source [*R.A.M.*, 32, p. 665]. Early and thorough roguing of infected plants and the adjacent, apparently healthy ones is recommended for controlling the virus. Early harvesting would not be economical locally.

Koshimizu (Y.), Hirai (T.), & Koiwa (T.). **Intracellular inclusions in Potato and other solanaceous plants affected by the X- and Y-viruses of Potatoes.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 102–108, 1 pl., 3 figs., 1953. [Japanese, with English summary. Received April, 1954.]

Deeply staining material (Lugol-Giemsa method), presumably virus, was found to extend around the periphery of epidermal cells of potato, tobacco, and tomato plants infected with the mottle strain of virus X. A more diffuse material, sometimes permeating the whole cell contents, was detected in the cytoplasm or near the nuclei. Potato varieties carrying the virus but appearing healthy contained similar inclusions at a later stage of growth. Small, granular inclusions were present in potato, tobacco, and tomato plants infected with the ordinary strain of virus Y, and diffuse, deeply staining materials, similar to those produced by X were also present. X and Y together produced the X-type inclusions alone or associated with the Y-type in the same cell in potato and tobacco plants, and also a large, X+Y type, vacuolated inclusion in potato plants in particular.

Chemical tests with Y-infected material suggested the presence of ribonucleic acid in the inclusions. It is concluded that the latter, particularly the non-crystalline variety, may be the product of interaction between both viruses and some host materials, though the crystalline inclusions within the nuclei were found to be pure nucleo-protein.

Broadbent (L.). **Aphids and virus diseases in Potato crops.**—*Biol. Rev.*, 28, 3, pp. 350–380, 1953.

Up-to-date information on the relative importance of the various factors influencing numbers and movement of the aphid vectors of potato viruses in different parts of the British Isles [*R.A.M.*, 32, p. 691] is presented under the headings of proximity of the aphid source, the environment in the potato crop, the distribution and movement of aphids on the potato plant, the reproduction of aphids, the development of winged aphids, the influence of weather on aphid flight, parasites and predators, virus transmission and epiphytology, and agricultural practice. A six-page bibliography is appended.

ROBERTS (Sir J. D.). **Virus tested Potatoes in Scotland.**—*Amer. Potato J.*, 30, 8, pp. 197–204, 2 figs., 1953.

The author gives a detailed account of the scheme begun in 1945 at Strathallan Farms, Auchterarder, for raising seed potatoes free from virus X [*R.A.M.*, 31, p. 628]. Large stocks of practically virus-free material have been built up by testing on indicator plants, especially *Datura stramonium*. As a result the Department of Agriculture of Scotland has been able to introduce two new classifications of 'seed' grade: 'Virus-tested' in 1951 and 'Foundation stock' in 1953. The former has been tested over six seasons; the plants must have no visible virus infection on field inspection. It is hoped that in a few years all seed stocks in Scotland may be free from virus X.

MEIER (W.). **Ergebnisse weiterer Untersuchungen über die Lebensweise der grünen Pfirsichblattlaus (Myzus persicae Sulzer) und ihre Anwendung im schweizerischen Saatkartoffelbau.** [Results of further studies on the life-habit of the green Peach aphid (*Myzus persicae* Sulzer) and their application in Swiss seed Potato production.]—*Mitt. schweiz. Landw.*, 2, 3, pp. 53–60, 4 figs., 2 graphs, 1954.

The following are among the practical conclusions drawn from the results of studies covering the period from 1948 to 1953 on the biology of *Myzus persicae* in relation to the occurrence of potato viruses in Switzerland [*R.A.M.*, 33, p. 172 and next abstract]. In 'degeneration areas', e.g., mild, low-lying sites and areas of intensive peach cultivation near large towns, aphid colonization may begin as early as mid-May, whereas in more exposed situations it tends to be delayed until mid-June, by which time the susceptibility of the plants has decreased with advancing maturity. Early planting and stimulation of the initial growth stages are effective precautions against infection. There is little difference between the plains and the mountains as regards the time of the summer flight of *M. persicae*, coinciding with the climax of virus spread, which takes place towards the end of June and early July. Even at altitudes exceeding 800 m. a few aphids were detected, one individual of *M. persicae* having been trapped in mid-May at a height of over 1,200 m. in the canton of Grisons. Consequently prophylactic measures, including the use of clean 'seed', timely roguing, and early harvesting, should not be neglected in such situations.

KELLER (E. R.). **Maßnahmen zur Erzielung von gesundem Kartoffelsaatgut.** [Measures for the production of healthy Potato seed.]—*Mitt. schweiz. Landw.*, 2, 3, pp. 61–65, 1 fig., 1954.

Among the methods recommended for the production of virus-free potato stocks in Switzerland [see preceding abstract] is the separation of the 'seed' plots from other potato stands (where complete isolation is impracticable) by strips of such crops as beet, summer barley, green maize, and the like, which affords a limited degree of protection against severe mosaic [potato virus Y], but is ineffectual for leaf roll. This expedient, however, cannot replace thorough and timely roguing, which should be carried out before mid-June in the plains.

RÖNNEBECK (W.). **Erfolgsaussichten der chemischen Bekämpfung von Virusüberträgern im Kartoffelfeld.** [Prospects for the success of chemical control of virus vectors in the Potato field.]—*Z. PflKrankh.*, 61, 3, pp. 113–129, 1 diag.; 4, pp. 184–196, 1954. [English summary.]

Some of the information in this detailed, fully tabulated account of experiments in Rhineland, Germany, on the control of *Myzodes* [*Myzus*] *persicae*, the principal vector of potato viruses, by spraying with systox (15 oz. per acre every 10 to 15 days) has already been noticed [*R.A.M.*, 33, p. 13]. From the results secured to date

it is concluded that the method will be of value chiefly to individual 'seed'-producers where the percentage of infection (predominantly leaf roll) [33, p. 497] is not below 1, the best results being secured over the range from 3 to 10 per cent., when the expenditure incurred and the profits realized are likely to be on a comparable level with those of blight (*Phytophthora infestans*) control.

Ross (H.) & Köhler (E.). **Das Verhalten deutscher Kartoffelsorten gegenüber verschiedenen Stämmen des X-Virus im Propfversuch. II. Mitteilung.** [The reaction of German Potato varieties to different strains of virus X in the grafting test. Note II.]—*Züchter*, 23, 3, pp. 72–86, 5 figs., 1953.

Another 42 German and 15 foreign potato varieties were used in further experiments with the nine strains and two populations of potato virus X already mentioned [*R.A.M.*, 31, p. 202] and others, which were assigned to the following groups: X^N ring strain, with an inactivation temperature of 68° to 70° C. and inducing a necrotic ring or tortoiseshell pattern on Samsun tobacco; X^N mottle strain, 68° to 72°, mottle pattern; X^E ring strain, 74°, necrotic or semi-necrotic pattern; and X^E mottle strain, 74°, milk-green mottle pattern. The varieties fell into three categories, namely, fully susceptible, fully hypersensitive, and partially hypersensitive [cf. 33, p. 497 and next abstract], the last-named enabling the X^N and X^E strains to be subdivided into the mottle and ring types.

The selfed seedlings of a fully susceptible variety, such as Bona, reacted uniformly to leaf rubbing and grafting with the X^N strain by the development of mosaic, whereas those of the fully hypersensitive Fortuna (Ella×*Solanum andigenum*) responded to a weak mottle strain (Jubel), some with mosaic and some with necrosis. Inoculated with weak strains of the virus, the seedlings of partially hypersensitive varieties, e.g., Panther and Voran, uniformly contracted mosaic, whereas powerful strains induced either acronecrosis, systemic necroses, or large, necrotic spots, or produced no symptoms at all. Similar responses were characteristic of Aquila and Mittelfrühe.

Köhler (E.). **Notizen über Pfropfung und Akronekrose bei Kartoffeln.** [Notes on grafting and acronecrosis in Potatoes.]—*Phytopath. Z.*, 21, 3, pp. 323–328, 4 figs., 1954.

Further studies on the hypersensitivity reaction in potatoes to virus infections are reported from the Virus Research Institute, Brunswick (formerly Celle). Two strains of potato virus X capable of causing severe necrosis failed to induce acronecrosis in the non-hypersensitive varieties Heida and Parnassia in grafting tests [see preceding abstract]. Fortuna, hypersensitive to all strains of virus X tested up to the present, proved hypersensitive also to the specially weak new strain Fl 4 from Flava. Fortuna was already known to be hypersensitive to the strain of potato virus A in Allerfrüheste Gelbe [*R.A.M.*, 33, p. 497], and it reacted comparably to Sab 48 from Sabina. In some of the particularly successful grafts of healthy Aquila and Voran on Erstling [Duke of York] carrying virus X the appearance of acronecrosis was markedly delayed.

Pozděna (J.), Hervert (V.), & Blattný (C.). **Tabak als Feldtest des Gesundheitszustandes der Kartoffeln und der Eignung der Lage für die Saatgutgewinnung —insbesondere was die aphidologische Beurteilung betrifft.** [Tobacco as a field indicator of the sanitary condition of Potatoes and the suitability of the site for 'seed' production—especially as regards aphidological assessment.]—*Čsl. Biol.*, 1, pp. 325-331, 1952. [Russian, with German summary. Abs. in *Z. PflKrankh.*, 61, 1, pp. 27–28, 1954.]

Healthy Samsun tobacco plants set out in the field between potatoes in Czechoslovakia in July, 1951, developed symptoms of potato virus Y [*R.A.M.*, 30, p. 67],

transmitted by *Myzodes* [*Myzus*] *persicae*. The test should prove useful in further investigations to determine the suitability of particular sites for 'seed' production, as well as indirectly in the assay of aphicides. Three applications at weekly intervals of nicotine and pyrethrum-containing preparations reduced the aphid population by 90 per cent.

Martin (C.). **Sur la présence de sucres réducteurs chez les Pommes de terre atteintes de virus de l'enroulement.** [On the presence of reducing sugars in Potatoes attacked by leaf roll virus.]—*C. R. Acad. Sci., Paris*, 238, 6, pp. 724–726, 1954.

A comparison by three different methods of the glucose and fructose contents of centrifuged preparations of potato leaves revealed six times as much in those infected with leaf roll virus as in healthy ones or up to ten times when mature foliage only was used. The most striking differences between the two lots were in the glucose contents.

In preliminary tests (using 200 plants) Van Duren's method for beet yellows virus diagnosis (VI^{e} Colloq. Jaunisse, Bergen-op-Zoom [? 1952]) was successfully applied as follows to potato leaf roll. A drop of centrifuged sap extract from mature leaves is placed on a sheet of filter paper and dried in the air; a saturated aqueous solution of aniline phthalate (960 mg. phthalic acid plus 1,460 ml. aniline in 100 ml. butanol) is atomized on the paper, which is then autoclaved at 100° to 110° C. for five to ten minutes. The spots corresponding to the leaf roll extracts turn blackish-brown, compared with the very faint yellow of those proceeding from healthy material.

In this connexion attention is directed towards some distinctive features of potato leaf roll and beet yellows viruses. Neither has been isolated in the pure state. Their transmission necessitates the presence of aphids on the plants for several hours, while in both diseases a latent period of hours must elapse before the aphid is able to transmit the virus. Glutamine and reducing sugars are accumulated in the hosts of both, and the ratio of glucide to protein nitrogen is increased.

Wallin (J. R.), Wade (E. K.), & Darling (H. M.). **The relation of weekly mean temperatures and cumulative rainfall to late blight epiphytotics in Wisconsin.** —*Amer. Potato J.*, 30, 10, pp. 231–242, 3 diags., 1 graph, 1953.

In the past 37 years potato blight (*Phytophthora infestans*) in Wisconsin was severe eight times, moderate eleven, slight ten, and absent in eight seasons [see next abstract]. Yearly tabulations of temperatures and rainfall for the 15 weeks from 1st June showed July weekly mean temperatures to have been somewhat higher in no-blight years, yet remaining below the critical 75° F., and weekly cumulative rainfall 4·4 in. higher in severe than in no-blight years; the final values for varying degrees of severity, however, remained within 1·8 in. of each other, and a 'critical' rainfall line midway between severe and no-blight years proved useless for forecasting, since favourable periods of high humidity were independent of actual amount of rainfall. Hypothetical forecasts, based on the occurrence of favourable conditions for two consecutive weeks, also failed. Thus the cumulative rainfall method of forecasting potato blight in Wisconsin proved unreliable.

Wallin (J. R.) & Samson (R. W.). **The relation of cumulative amount and frequency of rainfall and mean temperature to late blight in Indiana.**—*Amer. Potato J.*, 30, 11, pp. 262–270, 1953.

On the eastern seaboard of the United States the cumulative weekly mean amount of rainfall and the weekly mean temperature have been suggested as the most reliable indicators of the likely development of blight (*Phytophthora infestans*) [see preceding abstract] in the field. Differences in rainfall pattern between the

northern and southern sections of Indiana suggested that despite the Iowa results [*R.A.M.*, 28, p. 540] to the contrary, forecasts based upon temperature and cumulative rainfall might be successful in Indiana, also that blight development might be correlated more closely with rainfall frequency than with amount. Hence, temperature and rainfall (amount and frequency) data from Bluffton, Huntington, Washington, Princeton, and Shoals were analysed in relation to the occurrence of late blight in northern and southern Indiana for the period 1915 to 1951, inclusive, based on severity figures obtained from Purdue University. A 15-week period from 1st June was considered. The northern parts of the State had 26 years free of blight, and the southern 31; the severe blight years in the former were 1915, 1942, 1945, and 1950, and in the latter 1915, 1945, 1946, and 1950. Significant differences in rainfall amount slopes between group means for the three classes of blight years, severe, moderate, and trace, were obtained for the north only, while the means of the slopes of the cumulative rainfall frequency lines differed for southern but not northern Indiana. A 'critical' slope for the cumulative amount and frequency was computed midway between the means of the severe and no-blight groups. The greatest percentage of accurate hypothetical forecasts (93 to 94 per cent.) for both sections of the State was obtained from the combination of a weekly mean temperature of 75° F. or less and cumulative rainfall equal to or greater than the critical slope. However, all forecasts were only 65 to 67 per cent. accurate and this low figure indicated that there might be other moisture conditions influencing blight development, such as dew, fog, and guttation water. In both sections of the State the no-blight years were predicted with the greatest accuracy by all temperature-rainfall combinations.

NIEDERHAUSER (J. S.). **Observations on late blight and other Potato diseases in Peru.** —*Plant Dis. Reptr*, 38, 2, pp. 81–82, 1954. [Multilithed.]

During a survey by the author in March, 1953, of the potato growing areas in the Peruvian Andes (where the principal varieties belong to *Solanum andigenum*), blight (*Phytophthora infestans*) [*R.A.M.*, 33, p. 250] was found to be of little importance on the foliage in the highlands, though it sometimes caused serious tuber losses; this was attributed to the low mean air temperature, approaching freezing-point at night throughout the growing season, and the higher and more constant temperature of the soil. The disease was more severe at lower elevations, particularly at Patambuco, Marcapata, and Arequipa, and is said to be devastating in the coastal areas where control measures are inadequate.

Early blight (*Alternaria solani*) [30, p. 188] was fairly common at Puno.

TESCHNER (GERTRUD). **Untersuchungen über Alternaria solani, den Hartfäule-Erreger der Kartoffel und Fruchtfäule-Erreger der Tomate.** [Studies on *Alternaria solani*, the agent of hard rot of Potato and fruit rot of Tomato.]—*Phytopath. Z.*, 21, 2, pp. 133–162, 15 figs., 1953.

The symptoms induced by *Alternaria solani* on potato and tomato in Germany [*R.A.M.*, 31, p. 534] are described in detail, the name proposed for the potato tuber rot being 'hard rot' and for tomato fruit decay 'calyx end rot' [7, p. 411]. Natural infection by the pathogen was investigated in the field during 1949 and 1950, mostly in Rhineland and parts of Lower Saxony, with particular attention to calyx end rot.

The existence of a resting mycelium in *A. solani*, characterized by the presence of an amber-yellow pigment in thick-walled, chlamydospore-like cells, was demonstrated for the first time by *in vitro* morphological and physiological studies on 52 strains from potato leaves and tubers and tomato foliage and fruits. The fungus segregates into numerous biotypes [8, p. 737; 32, p. 404]; in general, the potato isolates were more aggressive than the tomato. The 20 potato varieties used in

inoculation tests fell into two groups, one susceptible (67 per cent. infection), represented by Allerfrüheste Gelbe, Bintje, and Erstling [Duke of York], and the other resistant (16 per cent.), exemplified by Ackersegen, Heida, and Immertreu.

Holmberg (C.). **Potatiskräftåtgärderna i Sverige under 25 år.** [Measures against Potato wart in Sweden during 25 years.]—*Växtskyddsnotiser, Stockh., 1953*, 5–6, pp. 90–92, 1953.

The 25th anniversary of the first legislative measures against potato wart disease [*Synchytrium endobioticum*] in Sweden [*R.A.M.*, 8, p. 736] was the occasion for this retrospect of some important phases of the campaign. The total number of records for the whole country over the period from 1928 to 1952 is given as 2,723, comprising 1,052 from 1928 to 1937, 1,150 from 1938 to 1947, and 521 from 1948 to 1952 [cf. 33, p. 313]. Immune varieties, first imported in the spring of 1929, are now used almost exclusively in the south for industrial products, but the replacement of the old-established, susceptible culinary varieties presented greater difficulties [28, p. 191]; Majestic is probably the most widely cultivated wart-immune potato. The first Swedish immune variety, Elsa, has already become popular for the table. Eva [28, p. 474; 29, p. 628] replaced the susceptible early varieties, such as Rose and Puritan [30, p. 189].

Schaal (L. A.), Johnson (G.), & Simonds (A. O.). **Comparison of scab resistance of Potato tubers as indicated by the ferric chloride test.**—*Amer. Potato J.*, 30, 11, pp. 257–262, 1 fig., 1953.

Applying their chlorogenic acid reaction for detecting resistance to *Streptomyces* [*Actinomyces*] *scabies* in potatoes [*R.A.M.*, 31, p. 454], the authors tested a large number of commercial and seedling potato varieties whose varietal reaction to scab had been determined by growing them in scabby soil. The sprout tips of resistant varieties as well as the tubers showed the presence of chlorogenic acid, the more resistant varieties turning deeper green. The resistant varieties were Russet Burbank, Hindenburg, U.S.D.A. seedling 627–164, Colorado seedling 7287, C.S.10548, C.S.11264, and C.S.11404.

Horsfall (J. G.), Hollis (J. P.), & Jacobson (H. G. M.). **Calcium and Potato scab.** —*Phytopathology*, 44, 1, pp. 19–24, 8 graphs, 1954.

Field trials were carried out at Connecticut Agricultural Experiment Station in 1949 to elucidate the role of calcium in the etiology of potato scab (*Streptomyces* [*Actinomyces*] *scabies*) [*R.A.M.*, 21, p. 469; 22, p. 272]. Five levels of both calcium sulphate and calcium carbonate ranging from 15 to 1,215 lb. per acre were applied to the loam soil (heavily manured with nitrogen to encourage the development of the pathogen) a week before planting infected Irish Cobbler seed pieces during the first week of May. At the time of the third sampling, 105 days later, the mean grades of tuber scab, using Horsfall and Barratt's improved grading system [25, p. 39], in the plots supplied with the minimum and maximum levels of calcium sulphate were 3·014 and 2·394, respectively, the lowest grade (1·729) being at the 45 lb. level; these corresponded to 2·14, 2·35, and 1·63 milliequivalents of calcium, respectively, per 1,000 gm. water-free tuber tissue, while the corresponding values for calcium carbonate were 2·129, 3·545, 2·206 and 1·74, 2·92, and 1·85.

These results are interpreted as follows. Scab is related to the calcium content of the tuber, which is regulated by the content of replaceable calcium in the soil, and this in turn is governed by hydrogen-ion concentration and calcium dosage. However, the explanation of the close connexion between the calcium content of the tuber and scab development presents some difficulty, since calcium is not known to be directly involved in cellular growth processes. Probably it acts indirectly or is a concomitant of some other element more immediately related to scab.

Hoffmann (G. M.). **Beiträge zur physiologischen Spezialisierung des Erregers des Kartoffelschorfes Streptomyces scabies (Thaxt.) Waksman und Henrici.** [Contribution to the physiological specialization of the agent of Potato scab *Streptomyces scabies* (Thaxt.) Waksman & Henrici.]—*Phytopath. Z.*, 21, 3, pp. 221–278, 17 figs., 1 diag., 3 graphs, 1954.

From an examination at the Phytopathological Institute of the Martin-Luther University, Halle-Wittenberg, of nearly 200 collections of scabby potato tubers of the 1950 and 1951 harvests in different parts of Germany the author concludes that *Streptomyces* [*Actinomyces*] *scabies* is the principal, if not the sole, agent of infection [*R.A.M.*, 13, p. 259; 19, p. 111]. The correlation established by Taylor and Decker between the cultural characters of the organism on separated milk and its pathogenicity to potatoes [26, p. 260] was confirmed, as also was the validity of Hooker's soy-bean test [28, p. 539].

No morphological disparities could be detected between a large number of geographically divergent collections, which did, however, vary qualitatively in starch hydrolysis, while the differential utilization of nitrogen and carbon compounds resulted in a marked diversity of growth types. Complex media were found to be unsuitable for racial analysis, failing to reveal the differences between individual collections which were observed on synthetic substrates. The minimum pH for germination and growth lay between 4·8 and 5. Within the range of 5 to 5·4 well-marked differences in development of the various races were recognized.

Hooker's technique for the evaluation of varietal resistance [29, p. 529] was applied in greenhouse and field tests on ten varieties, the results corroborating those of lengthy field experience in respect of Ackersegen and Frühnudel, which were susceptible to only a few of the most generally aggressive races.

The existence of far-reaching physiologic specialization within *A. scabies* is considered to be proved by the outcome of these studies.

Hooker (W. J.). **Pentachloronitrobenzene soil treatment for Potato scab and Rhizoctonia control.**—*Plant Dis. Reptr*, 38, 3, pp. 187–192, 2 figs., 1954. [Multilithed.]

In experiments carried out in 1953 at Clear Lake, Iowa, 100 per cent. active pentachloronitrobenzene [cf. *R.A.M.*, 32, p. 535] at 500 lb. per acre for broadcast and 200 lb. for furrow applications gave very satisfactory control of *Streptomyces* [*Actinomyces*] *scabies* [32, p. 587; 33, p. 314] and *Rhizoctonia* [*Corticium*] *solani* [28, p. 416; 30, p. 68] on Cobbler potatoes. Yields were increased from 372 (untreated) to 474 bush. per acre by furrow applications of 50 lb. and were not impaired by 2,000 lb.

Kole (A. P.). **A contribution to the knowledge of Spongospora subterranea (Wallr.) Lagerh., the cause of powdery scab of Potatoes.**—*Tijdschr. PlZiekt.*, 60, 1, pp. 1–65, 8 pl., 1 diag., 11 graphs, 1954. [Dutch summary.]

This exhaustive study on powdery scab (*Spongospora subterranea*) of potato comprises two sections, the first (preceded by a brief general introduction) dealing with the morphology, cytology, and life-history of the fungus and the second with the relationship of environmental factors to infection. In Holland the disease is largely restricted to the sandy and sandy-peat soils of the north-east, where it is not severe except in very wet seasons, but methods of control are under investigation at the Phytopathological Institute, Wageningen [*R.A.M.*, 29, p. 328], in order to comply with the requirements of importing countries which demand freedom from scab as a condition of entry.

Observations on the life-cycle are in general agreement with those on related genera. Fusions of zoospores appeared to be purely vegetative. Two phases of tuber

infection could be recognized: penetration and necrosis of the invaded cells followed by stimulation of cell division and the formation of warts. The development of the warts is ultimately arrested by the formation of a wound periderm under the site of infection, but by this time the fungus may have already spread through the surrounding epidermal tissue, causing dry rot.

Germination of the resting spores appears to be accelerated by drying and there are indications that the roots of a host are indispensable to its occurrence. In air-dry soil the resting spores survived 56 days' exposure to a temperature of —24° C. The minimum, optimum, and maximum temperatures for root hair infection were below 11°, 14° to 20°, and 22° to 25°, respectively. Between the limits of 5·2 and 7·5 the hydrogen-ion concentration of the soil exerted little influence on the invasion of the root hairs. At 16° to 20° the incubation period of tuber and root infection was less than three weeks.

Thirumalachar (M. J.). **Cercospora leaf spot and stem canker disease of Potato** —*Amer. Potato J.*, 30, 4, pp. 94–97, 4 figs., 1953.

A potato leaf and stem canker disease caused by *Cercospora solani-tuberosi* n.sp. is of widespread occurrence in Bihar and Uttar Pradesh, India [*R.A.M.*, 33, p. 449]. In the latter part of December (planting being in October) the older leaves near the ground develop yellowish-brown, circular to polygonal spots, 2 to 5 cm. in diameter, which often coalesce. On some susceptible varieties like O.N.208 and Hyb.19 the spots are large with concentric zonations. About the first week in January lesions appear on stems and petioles as linear to lenticular patches, which later lengthen to 2 to 4 cm., blacken, and bear the fructifications. The stem tissue becomes necrotic; the stems lie mostly prostrate and are easily injured by heavy winds. The infected plants dry prematurely and the crop appears as if affected by severe drought.

The conidiophores of the fungus are yellowish-brown, 2- to 3-septate at the base, unbranched, geniculate, paler towards the apex, and measure 30 to 110 by 3·4 μ; the conidia are obclavate to cylindrical, 1- to 12-septate, hyaline, obtruncate at the base, acute at apex, and 41 to 120 by 3·35 μ. The fungus aestivates on plant debris by forming sclerotial bodies, which are transformed stromata.

Leaves inoculated with conidia produced naturally on the host became infected after 15 days in 15 out of 25 cases.

In Bihar a prophylactic spray of 5–5–50 Bordeaux, 0·3 per cent. perenox, or dithane Z-78 (1½ lb. in 100 gals. water) has given good results. One or two sprays at an interval of 14 days after the 20th December protected the plants against stem lesions and leaf spotting and kept them green for a longer period than the unsprayed.

Robinson (D. B.) & Ayers (G. W.). **Fusarium storage rot of Potatoes in Prince Edward Island.**—*Canad. J. agric. Sci.* (formerly *Sci. Agric.*), 33, 6, pp. 566–571, 1 pl., 1953.

Data obtained at the Laboratory of Plant Pathology, Charlottetown, Prince Edward Island, indicate that rot of stored potatoes in Prince Edward Island is due chiefly to *Fusarium sambucinum* f. 6 [*Gibberella cyanogena*: *R.A.M.*, 32, p. 693]; *F. avenaceum* [21, p. 158] and *F. caeruleum* [32, p. 437; 33, p. 313] were encountered in a few instances.

Darling (H. M.). **Ring rot survey, 1940–1951**—*Amer. Potato J.*, 30, 8, pp. 184–185, 1953.

The author in his capacity as Chairman of the Seed Certification Committee of the Potato Association of America has collected data which show that the incidence

of ring rot [*Corynebacterium sepedonicum*: *R.A.M.*, 32, p. 208; 33, p. 466] has increased in the seed-producing areas of the United States and Canada from a five-year average (1940 to 1945) of 5·4 per cent. to approximately 9·2 per cent. (1946 to 1951). Most States have decided that ring rot cannot be eradicated by regulation and inspection alone and recommend the taking of precautionary measures to prevent contamination of healthy seed stocks.

Nielsen (L. W.). **The susceptibility of seven Potato varieties to bruising and soft rot.**—*Phytopathology*, 44, 1, pp. 30–35, 1 fig., 1954.

In comparative experiments at the North Carolina State College Irish Cobbler and Bliss Triumph were the most susceptible of seven potato varieties to bruising, Essex, Kennebec, Chenango, and Sebago were resistant, and White Cloud was intermediate. All the varieties were more or less susceptible to bacterial soft rot (*Erwinia carotovora*) [cf. *R.A.M.*, 26, p. 352], Irish Cobbler probably the most so, followed by Chenango and White Cloud, while Essex and Bliss Triumph were consistently more resistant. On a total infection basis Kennebec and Sebago appeared resistant, but the invaded tissue of these varieties soon became soft and in this respect they were more representative of the susceptible group.

An incubation temperature of 61° F. reduced the incidence of bacterial infection of wounds and retarded soft rot development. Tubers of all varieties acquired enhanced susceptibility to infection as a result of heating above 110° F. (*Amer. Potato J.*, 23, pp. 41–57, 1946).

Ellison (J. H.). **Varietal susceptibility to internal brown spot of Potatoes.**—*Amer. Potato J.*, 30, 4, pp. 92–94, 1953.

In the regular potato variety trials at the Long Island Vegetable Research Farm, from 1948 to 1951, samples of 20 tubers each were placed in common storage immediately after harvest. During the first week of February in each year they were sliced into quarters longitudinally and all cut surfaces examined for brown spot [*R.A.M.*, 30, p. 286]. All lesions, however small, were considered. Pontiac, Kennebec, Katahdin, and Mohawk were relatively resistant (0 to 13 per cent.) and Ashworth consistently susceptible (24 to 42); Essex, Sebago, and Ontario fluctuated from year to year.

VanMiddelem (C. H.), Jacob (W. C.), & Thompson (H. C.). **Spectrophotometric comparison of internal black spot and melanin.**—*Amer. Potato J.*, 30, 4, pp. 85–88, 1 graph, 1953.

Spectrophotometric investigations [? at Cornell University, New York] of pigments from discoloured areas of potato tubers affected by black spot [*R.A.M.*, 32, p. 693] showed the substances to be closely related to melanin extracted from fresh potato tuber sap and from sap plus tyrosine and not to the blackening developing after cooking.

Van der Vecht (J.). **The problem of the mentek disease of Rice in Java.**—*Landbouw*, 25, 1–6, pp. 45–130, 4 graphs, 2 maps, 1953. [Indonesian summary.]

After a detailed survey of the literature on mentek disease of rice [*R.A.M.*, 15, p. 312; 33, p. 48] from 1859 to 1950, listed in a seven-page bibliography and discussed in four sections (before 1900, 1900 to 1910, 1910 to 1930, and 1930 to 1950), the author describes the symptoms of the disease, its distribution in Indonesia, the fluctuations in its intensity from 1916 to 1940, factors influencing its development, varietal resistance, soil and climatic factors, and cultural practices.

It is concluded that it is desirable to consider the periodicity of mentek in relation to variations of both pathogenic and physiological factors. The most destructive

form of the disease is due to severe root infestation by the nematode *Radopholus oryzae*, which increases rapidly during the wet season as soil fertility decreases. Intensity depends on the balance between root destruction and root regeneration, which in turn will depend on cultural, soil, climatic, and other factors. The view that root rot is due primarily to nutritional factors, e.g., potassium deficiency [loc. cit.], is rejected.

NAITO (H.). **Studies on mold microflora in stored Rice grains, with special reference to osmotic pressure.**—*Ann. phytopath. Soc. Japan*, 18, 1–2, pp. 41–45, 1953. [Japanese.]

From samples of stored rice grain with different moisture contents 12 species of *Penicillium*, eight of *Aspergillus*, and a few of other genera, e.g., *Mucor*, *Absidia*, *Syncephalastrum*, *Rhizopus*, *Dematium*, *Oidium*, *Verticillium*, and *Monilia*, were isolated [cf. *R.A.M.*, 32, p. 507]. Heavier infection developed on seed stored at 20° C. than at 10° or 30°, while moisture contents of 18 and 20 per cent. were more conducive to mould growth than those of 15 and 22 per cent. The osmotic pressure of the spores ranged from 19·6 to 134·8 atm., the maximum being reached on grain with a 15 per cent. moisture content. Mould growth seems to occur only when the osmotic pressure of the fungus is about five times higher than that of the seed, a level that was not attained with moisture contents below 14·5 per cent.

ŌTANI (Y.). **Carbon sources of Piricularia oryzae Cavara.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 119–120, 1953. [Japanese, with English summary. Received April, 1954.]

Of various carbon sources tested, maltose, sucrose, glucose, inulin, mannitol, succinic acid, fructose, soluble starch, lactose, citric acid, and galactose gave the best mycelial growth, in that order, of *Piricularia oryzae* [*R.A.M.*, 32, p. 450; 33, p. 500 and next abstract] on a medium supplemented with B vitamins.

YOSHII (H.). **On the influence of cephalothecin upon the secretion of some carbohydrases by the blast fungus.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 124–128, 1 fig., 1953. [Japanese, with English summary. Received April, 1954.]

The addition of cephalothecin [*R.A.M.*, 31, p. 82] at various concentrations and carbohydrate to nutrient liquid cultures of *Piricularia oryzae* [see preceding abstract] caused an increase in dry weight of the mycelial mat (M) over cultures receiving cephalothecin alone, and a decrease in the weight of non-reducing sugars (S). The ratio S:M is provisionally termed the relative secretion value.

Maltose and sucrose supplied as carbon sources yielded sucrase-type secretions, the S:M ratio being highest when the concentration of cephalothecin was 1 in 20. Soluble starch solutions yielded amylase-type secretions at 1 in 40 cephalothecin. No cellulose was utilized by the fungus in the presence of the compound. Growth in solutions of 1 in 5 to 1 in 10 cephalothecin was extremely poor. The S:M phases suggest some connexion between carbohydrase secretion by *P. oryzae* under the influence of cephalothecin and the blast resistance of rice plants treated with it [loc. cit.].

SUZUKI (N.), DOI (Y.), & TOYODA (S.). **Histochemical studies on the lesions of Rice blast caused by Piricularia oryzae Cav. II. On the substance in the cell-membrane of Rice reacting red in colour with diazo reagent.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 97–101, 3 figs., 1953. [Japanese, with English summary. Received April, 1954.]

Further studies in this series [cf. *R.A.M.*, 32, p. 449] showed that the brown discoloration of leaf tissue infected by *Piricularia oryzae* is due to chlorogenic acid which appears to exist in combination with a certain constituent of the cell wall.

Akai (S.). **Studies on Helminthosporium blight of Rice plants. VII. On the relation of silicic acid supply to the outbreak of Helminthosporium blight or blast disease in Rice plants.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 109–112, 1953. [Japanese, with English summary. Received April, 1954.]

Soil applications of silicic acid increased the resistance of the pedicels and spikes of rice plants to blast [*Piricularia oryzae*: *R.A.M.*, 31, p. 140], but the addition of boric acid or copper sulphate reduced the beneficial effect of silica. Similar reactions were secured with *Helminthosporium* blight [*Ophiobolus miyabeanus*: see next abstract]. The supply of silicic acid increased the silicification of the epidermal walls in mature leaves; a single boric acid application gave slight increase, but copper sulphate inhibited silicification.

Akai (S.) & Fukutomi (M.). **Effect of manganese on the susceptibility of Rice to the brown spot.**—*Agric. & Hort., Tokyo*, 29, 3, pp. 413–414, 1953. [Japanese.]

The results of inoculations on rice plants in water and sand cultures showed that the number of brown spot [*Ophiobolus miyabeanus*: see preceding abstract] lesions per leaf decreased with an increase in the amount of manganous chloride added to the solution [cf. *R.A.M.*, 33, p. 378], especially at concentrations exceeding 10^{-3} M., the action of which reached a climax after 24 hours' absorption through the roots. Spraying the leaves with the compound at the same strength produced a similar but somewhat slighter effect.

Nishiwaza (T.). **On the relation between the Rice nematode disease 'white tip' and the stem rot of Rice plants.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 137–140, 1953. [Japanese, with English summary. Received April, 1954.]

Stem rot was less severe in potted Asahi rice plants inoculated simultaneously with white tip nematodes and sclerotia of *Helminthosporium sigmoideum* [*Leptosphaeria salvinii*: *R.A.M.*, 33, p. 445] than in those inoculated with the fungus alone, but ear and grain weight decreased in the following order: fungus alone, nematode alone, mixed infection.

Tollenaar (D.). **Dothidella ulei en de Rubbercultuur op het westelijk halfrond en in Z.O.-Azië.** [*Dothidella ulei* and Rubber cultivation in the western hemisphere and in south-east Asia.]—*Bergcultures*, 23, 3, pp. 55, 57, 59, 61; 4, pp. 93, 95, 97, 99, 101, 103, 1954. [English summary.]

Much of the information in this useful survey of the existing position in respect of *Dothidella ulei* as a factor in *Hevea* rubber cultivation in Latin America and the possibility of its introduction into south-east Asia [*R.A.M.*, 33, pp. 113, 258] has already been noticed from other sources. At an inspection in November, 1952, of the various resistant top clones now undergoing trials at Los Diamantes Co-operative United States Department of Agriculture Rubber Station, Costa Rica, the writer was particularly impressed by FX 25, FX 645, FX 516, IAN-45-717, and IAN-45-443, the two last-named being also resistant to *Phytophthora* [*palmivora*].

Control of root disease in young Rubber.—*Plant. Bull. Rubb. Res. Inst. Malaya*, N.S. 4, pp. 22–24, 1953.

For the control of root disease, due to *Fomes lignosus*, *Ganoderma pseudoferreum*, and *F. noxius*, on young rubber trees in Malaya [*R.A.M.*, 33, p. 257] an annual tree to tree inspection of the collar and upper root system is recommended for the first five years. Where attacks are heavy two rounds a year for the second, third, and fourth year are necessary. The depth of root exposure should be 2 in. in the first year and 6 to 9 in. at four years. All detected sources of infection and infected roots should be removed to ensure the eradication of the disease before the stand is

ten years old, followed by treatment of the remaining roots carrying purely superficial mycelium with 2 per cent. copper sulphate solution. Complete eradication of dead or heavily infected trees is essential.

Boucher (J.). **Observations sur l'hygiène préventive du sol en culture intensive.** [Observations on the preventive hygiene of the soil in intensive culture.]—*Rev. hort., Paris*, 126, 2199, pp. 1068–1071, 4 figs., 1954.

Referring to the presence in market-garden soils at Nantes, France, of *Sclerotinia fuckeliana* causing damping-off of lettuce, *S. minor* and *Verticillium* ? *albo-atrum* pathogenic on tomato, *Fusarium* sp. infecting carrot roots, *F.* [*bulbigenum* var.] *niveum* attacking melon, and *Helicobasidium purpureum* infecting carrot and asparagus, the author states that the infested soils in every case contain an excess of nitrogen and phosphorus or of nitrogen and potassium. The fertilizers used are unsuitable and undesirable cultural practices are followed. Directions are given for improving soil conditions by the use of a balanced organic compost. Soil treatments with zineb, ziram, thiram, captan, and oxyquinoline are also suggested.

Evans (E.). **Soil recolonization tube for studying recolonization of sterilized soil by micro-organisms.**—*Nature, Lond.*, 173, 4416, p. 1196, 1 diag., 1954.

A device designed at the Botany School, Cambridge, for studying the fungal and bacterial recolonization of sterilized soil [*R.A.M.*, 33, p. 179], enabling successive samples to be taken from a single tube for an indefinite period with the minimum of labour and disturbance to the surrounding soil, consists of an 18-in. length of Pyrex glass tubing of 1 in. internal diameter with six side-arms 1 in. long and ½ in. internal diameter fused at 2-in. intervals along its length. It is evenly packed with moist soil which has been passed through a 2-mm. sieve, the ends and side-arms are plugged with cotton wool, and the complete tube is weighed. After sterilization an inoculum of non-sterile soil is added at one end and small samples of soil are removed at intervals through the side-arms.

Following steam treatment at 1 atm. for 30 minutes on two successive days the first fungal colonists of Kettering loam following reinoculation with unsterilized soil were species such as *Pythium acanthicum* and *Zygorrhynchus vuilleminii*, regularly followed by *Trichoderma viride*, *Mucor ramannianus*, and *Fusarium caeruleum*. *T. viride* tended to be the first colonizer if the soil was not packed sufficiently tightly.

Bunt (A. C.). **Steam pressure in soil sterilization. I. In bins.**—*J. hort. Sci.*, 29, 2, pp. 89–97, 3 graphs, 1954.

Comparisons made to ascertain the role of boiler pressure in the sterilization of soil in bins showed the time needed to heat the soil to be dependent on steam quantity, regardless of pressure. For loam of 25 to 30 per cent. moisture content (oven dry weight) 6 lb. steam per cu. ft. was needed to raise the temperature of medium loam from 54° to 212° F., though in a properly designed system a pressure of 2 lb. per sq. in. in the grid is adequate.

Schmidt (Trude). **Die Alternaria-Dörrfleckenkrankheit der Lallemantia iberica.** [The *Alternaria* dry spot disease of *Lallemantia iberica*.]—*PflSchBer.*, 12, 1–2, pp. 1–14, 5 figs., 4 graphs, 1954. [English summary.]

The green aerial parts of *Lallemantia iberica* plants, now under experimental cultivation at the Institute for Agriculture, Vienna, were severely damaged in 1951 and 1952 by an *Alternaria* disease [*R.A.M.*, 25, p. 416], characterized by grey to blackish-brown, zoned lesions, up to 1½ cm. in diameter. The causal organism is described and identified as *A. porri* f.sp. *lallemantiae* n.f.sp. In pure culture on malt

agar the minimum, optimum, and maximum temperatures for mycelial growth were just over 0°, 27°, and 36° C., respectively. Sporulation did not normally occur in culture and could be induced only by the illumination from 6.30 a.m. to 4 p.m. of freshly inoculated cultures at a distance of 20 cm. from a Philips 40W daylight tube, which quickly resulted in the production of conidia agreeing with those described for the species.

The disease, which has also been reported from Czechoslovakia (*Ann. Acad. tchécosl. Agric.*, 25, pp. 343–346, 1952), is seed-borne and could not be controlled in spraying experiments with any of the standard fungicides.

Campos (A. R.). **Nota sôbre a obtenção da forma perfeita da ferrugem da Hortelã Pimenta, em laboratório.** [Note on the development of the perfect state of Peppermint rust in the laboratory.]—*Rev. Agric., Piracicaba*, 28, 5–6, pp. 175–188, 8 figs., 1 graph, 1953. [English and German summaries.]

The teleuto state of *Puccinia menthae* has not yet been observed in nature in Brazil [C.M.I. map No. 211], but when peppermint leaves heavily infected by uredosori of the rust were placed in moisture chambers and exposed to temperatures between 7·8° and 12° C., teleutosori were produced after 53 days. Similarly, infected branches in tap water in Erlenmeyer flasks gave rise to teleutosori after 17 and 23 days at 7·8° and 10·5°, respectively.

Annual Report of the Sugarcane Breeding Institute, Coimbatore, for 1952–53.—174 pp., [? 1953. Received 1954.] 5*s*.

In the section of this report by the director, N. L. Dutt (pp. 1–36), the following sugar-cane varieties are listed as resistant to red rot [*Physalospora tucumanensis*: *R.A.M.*, 33, p. 381] as a result of field inoculation tests at Coimbatore, India: Co. 356, 393, 421, 453, 508, 966, 967, 969, 971, 979, and 980. The *Saccharum spontaneum* varieties SES 24, 29, 69, 100A, 103, 108A, 113A, 205B, 208, and 220 are rated as immune. *Puccinia kuehnii* [30, p. 1] was collected on Co. 876 in Madras.

In the section containing the progress report of the Spontaneum Expedition Scheme (pp. 63–101), it is recorded that during the 1952–3 survey *P. kuehnii* was observed on eight varieties of *S. spontaneum* and seven of *Erianthus* [*Saccharum*] *arundinaceum*. *Sphacelotheca schweinfurthiana* [26, p. 80] was present on four varieties of *E.* [*S.*] *munja* in the field. [Sugar-cane] mosaic [virus] was found in the *S. spontaneum* varieties SES 320, Taiwan II, Thick gigas, and Tobango. Leaf shredding caused by a species of *Sclerospora* was recorded on SES 278.

Control of mosaic in propagation plots.—*S. Afr. Sug. J.*, 37, 5, p. 301, 1953.

In consequence of a report by the Government Cane Inspector on the fairly widespread incidence of sugar-cane mosaic on the south coast of Natal, severely attacking the newly released N:Co.339 variety and a few canes also of N:Co.293 [*R.A.M.*, 31, p. 143], N. C. King has prepared suggestions for the control of the disease by the choice of suitable areas for propagation plots, remote from maize plantings and small areas of natural bush which usually harbour the perennial grass host, *Setaria sulcata*, of the virus; by clean cultivation, with special attention to the eradication of *Sorghum verticilliflorum* and other grass hosts; and by roguing at two- to three-weekly intervals from the time the canes reach 1 ft. in height.

Stehlé (H.). **La maladie à virus des stries chlorotiques de la Canne à Sucre aux Antilles françaises, son importance et les moyens de lutte.** [The chlorotic streak virus disease of Sugar-Cane in the French Antilles, its importance and control methods.]—*Agron. trop., Nogent*, 9, 2, pp. 201–205, 1 fig., 1954.

After stating that sugar-cane in Guadeloupe and Martinique is affected by chlorotic streak [C.M.I. map No. 29; *R.A.M.*, 31, p. 144] the author briefly reviews and

discusses the available information on the disease in the light of observations made locally. In Guadeloupe the first and second suckers of P.O.J.2878, B.37161, B.37172, and B.34104 are the most susceptible, though B.37161 is much less so than P.O.J.2878; the new Barbados varieties are not very susceptible. In the French West Indies the disease is kept under control by planting resistant varieties, obtaining cuttings from unaffected areas, hot water treatment, and improved cultural methods. The disease has been present for some years but gives no cause for alarm.

Yen (W. Y.), Lo (T. C.), & Chi (C. C.). **Black stripe disease of Sugar Cane.**—*Sugarcane Res., Taiwan*, 7, 1, pp. 1–15, 1953. [Chinese, with English summary. Abs. in *Sugar, N.Y.*, 49, 2, p. 56, 1954.]

A hitherto unreported disease observed on sugar-cane in Formosa has been named black stripe. The initial symptoms appear on both sides of the leaf as minute, yellow, round or oval spots, later developing into long, narrow, brownish-black streaks, usually bounded by two leaf veins. The general aspect is reminiscent of brown stripe (*Helminthosporium stenospilum*) [*Cochliobolus stenospilus*: *R.A.M.*, 28, p. 142], but the fungus responsible for black stripe is a *Cercospora* with slender, hyaline hyphae.

Tsukamoto (E.). **New or noteworthy fungi parasitic on useful plants in the Tôhoku district.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 121–123, 5 figs., 1953. [Received April, 1954.]

Further studies on fungi occurring in the Tôhoku district of Japan [*R.A.M.*, 32, p. 401] yielded the following new species, attributed to Togashi and Tsukamoto. *Leptosphaeria nandinae*, having subcarbonaceous, globose to depressed perithecia measuring 300 to 400 by 130 to 200 μ; clavate, tapering asci, 90 to 95 by 10 to 13·5 μ; brown or blackish-brown, straight or slightly curved, 3- to 10-septate ascospores, 30 to 36 by 6 to 7 μ; scattered, dark pycnidia, 300 to 370 by 150 to 200 μ; and numerous spherical or ellipsoidal, brown conidia, 2·5 to 5 by 2·5 to 3 μ, causes stem blight of the ornamental *Nandina domestica*.

Rhabdospora orientalis is characterized by sparse, black, globose pycnidia, 150 to 170 μ in diameter; straight, hyaline conidiophores, 10 to 15 by 3 to 4 μ; and curved, 3- to 4-septate conidia, 50 to 60 by 2·5 to 2·8 μ; it causes die-back of *Biota* [*Thuja*] *orientalis*.

Diplodia cerci-chinensis, causing twig blight of *Cercis chinensis*, has depressed, blackish-olive pycnidia measuring 400 to 450 by 150 to 250 μ and numerous smooth, uniseptate conidia, 15 to 21 by 8 to 11 μ.

Macrophoma forsythiae, causing twig blight of *Forsythia suspensa*, has dark, depressed, erumpent pycnidia measuring 140 to 240 by 170 to 180 (usually 180 by 150) μ; oblong-ellipsoid or cylindrical, tapering pycnidiospores, 18 to 30 by 5 to 6·2 (28 by 5·8) μ, and conidiophores 15 to 20 by 2·5 to 3 μ.

M. akitensis, causing twig blight of *Catalpa ovata*, is characterized by scattered, blackish-brown pycnidia measuring 110 to 180 by 90 to 150 μ and hyaline, straight or slightly curved, guttulate pycnidiospores, 24 to 33 by 5 to 7 μ.

Hara (K.). **A list of Japanese fungi hitherto known, fourth edition.**—447 pp., 6 pl., 1954.

This revised list [cf. *R.A.M.*, 7, p. 672], published at the author's expense, contains 7,300 names of fungi collected in Japan, Formosa, North China, and Manchuria (pp. 1–398), the hosts of every species and the principal bibliographic references being given in Japanese, which is also used for the host and fungus index (pp. 410–444). Seventeen new species are described, namely, *Belanidium japonicum*, *Myriangium tuberculifera*, *Mycosphaerella kabocha*, *M. fuiiensis*, *M. pourthiaeae*, *Sphaerulina dioscoreae*, *Phomopsis biwa*, *P. natsume*, *Colletotrichum morina*,

Cercospora daidai, *Botrytis sekimotoi*, *Spicaria satoi*, *S. shirako*, *S. mori*, *S. purpuroidea*, *Sphaerulina carica*, and *Leptosphaeria zizaninaevora*.

PETRAK (F.). **Beiträge zur Pilzflora von Hawaii.** [Contributions to the fungus flora of Hawaii.]—*Sydowia*, 7, 5–6, pp. 381–409, 1953.

Besides 32 new species, this critically annotated list of Hawaiian fungi from United States herbarium material of 1927–8 comprises a number of other records, including *Rhizopus artocarpi* on young fruits of *Artocarpus* sp. [*R.A.M.*, 28, p. 530]; *Graphiola phoenicis* on living foliage of a palm (? *Phoenix* sp.); *Leptosphaeria sacchari* on living and dying sugar-cane leaves [29, p. 123; 31, p. 375]; *Phaeosaccardinula morindae* on living guava foliage; and *Colletotrichum papayae* on fruits of papaw [cf. 8, p. 25] and on dry branches in association with *Phomopsis papayae* [cf. 5, p. 189].

GREMMEN (J.). **Some noteworthy discomycetous fungi on coniferous hosts.**—*Sydowia*, 7, 1–4, pp. 141–145, 1 fig., 1953.

The three interesting discomycetes described in this paper include a new species and *Pseudographis* (*Hysterium*) *pinicola* collected on *Abies* sp. in the Black Forest, Germany. The nomenclatural starting-point of *Crumenula pinicola* [*R.A.M.*, 25, p. 283] is considered to be *Peziza pinicola* Fr. and not *P. pinicola* Rebent.

DONK (M. A.). **Notes on resupinate Hymenomycetes—I. On Pellicularia Cooke.**—*Reinwardtia*, 2, 3, pp. 425–434, 1954.

The literature relating to the genus *Pellicularia* [*R.A.M.*, 30, p. 248; 33, p. 383] is analysed. The author concludes that *Pellicularia* is a *nomen confusum*, being based on the vegetative hyphae of a resupinate basidiomycete and the associated spores of one of the fungi imperfecti. The name *Botryobasidium* Donk (1931) is considered to be the correct generic name.

LING (L.). **Taxonomic notes on the Ustilaginales. II.**—*Lloydia*, 16, 3, pp. 180–192, 2 figs., 1953.

In this further contribution [*R.A.M.*, 31, p. 209] notes are given on more smuts in various herbaria [cf. 33, p. 450], mostly on grasses from tropical Africa, including ten new species and four new combinations.

RAYSS (T[SCHARNA]). **Étude de quelques Ustilaginées recoltées en Palestine.** [A study of some Ustilaginales collected in Palestine.]—*Palest. J. Bot.*, J. Ser., 5, 4, pp. 229–236, 1952. [Hebrew summary. Received February, 1954.]

This annotated list of smuts collected in Palestine [cf. *R.A.M.*, 15, p. 683; 26, p. 173] comprises 26 species, of which two are new. It includes *Entyloma calendulae* on *Calendula aegyptiaca*, *Tilletia foetens* [*T. foetida*] on wheat, *T. tritici* [*T. caries*] on wheat and *Aegilops cylindrica*, *Ustilago avenae* [23, p. 336] on *Avena sterilis*, *Sorosporium reileanum* [*Sphacelotheca reiliana*: C.M.I. map No. 69] on *Andropogon distachyos*, *S. andropogonis* on *A. hirtus* [cf. *R.A.M.*, 27, p. 586], and *S. cruenta* on *Sorghum halepense*.

T. foetida was found on wheat ears, on the surface of imported 'Russian Wheat' seeds at Haifa, and on wheat grain purchased in the market at Jerusalem. It was also found on various wheat varieties grown by Arabs, 74 per cent. of the ears being affected, as against 8 per cent. for *T. caries* and 18 per cent. for both together.

LOWE (J. L.). **Studies in the genus Poria. V.**—*Pap. Mich. Acad. Sci.*, 39 (*1953*), pp. 31–35, 1954.

Continuing his studies on the genus *Poria* [*R.A.M.*, 28, pp. 361, 596], the author gives notes on eight species which are reduced to synonymy, one recorded with

certainty in North America for the first time, and *P. oleracea* [26, p. 573], previously described from culture, which is reported from the first time in nature on oak.

BAXTER (D. V.). **Some resupinate polypores from the region of the Great Lakes. XXV.**—*Pap. Mich. Acad. Sci.*, 39 (*1953*), pp. 125–138, 6 pl., 4 diags., 1954.

In further studies on North American polypores [cf. *R.A.M.*, 32, p. 652] the author discusses certain wood-rotting species found in the region of the Great Lakes, as well as some not known there, in order to discover the factors determining their incidence and population. The quantity of sporophores of *Poria weirii* [loc. cit.] that may be collected near the north-eastern limits of the range of western red cedar (*Thuja plicata*) in the Interior Belt of British Columbia at any given time would exceed considerably that in most coastal areas and in the centre of the host range, but if *P. albipellucida* [30, p. 18], which also causes a significant rot of red cedar, is also considered it is evident that factors other than mere distribution within the range of the host are operating. There were 40 *P. weirii* infections on 110 red cedar poles from the Interior Belt and one of *P. albipellucida* as against 0 and 63, respectively, on 615 coast poles examined.

Polyporus [*Polystictus*] *cuneatus* [31, p. 401] is the fungus chiefly responsible for decay of *T. plicata* sapwood and slash. *Polyporus leucospongia* [30, p. 594] causes a yellow, cubical heart- and sap-rot of decorticated coniferous timber (chiefly Engelmann spruce, *Picea engelmanni*, and lodgepole pine, *Pinus contorta* var. *latifolia*), particularly wind-blown and fire-killed timber in the high forests of the Rocky Mountains and the west coast. It is often the chief cause of decay in round timbers in service at relatively high elevations, such as highway guard railings in Yellowstone Park.

Polyporus fibrillosus [31, p. 401], widely distributed in the United States, causes a brown trunk rot in living Sitka spruce (*Picea sitkensis*) and also attacks the heart- and sapwood of a small percentage of wind-thrown timber.

HUYSMANS (C. P.). **Een eenvoudige micro-koperanalyse, gebruikt bij fungicidenproven in Thee.** [A simple micro-copper analysis used in assays of fungicides on tea.]—*Arch. Theecult.*, 18, 3, pp. 207–222, 3 graphs, 1953. [English summary.]

A new method for the determination of copper [*R.A.M.*, 32, p. 326] on tea sprayed against blister blight [*Exobasidium vexans*: 33, p. 505] with copper Bayer, koneprox, copper Sandoz, and copper naphthenate in Sumatra is described. In the presence of copper ions and 0·1 N. sodium thiosulphate the reduction of ferric to ferrous solutions is considerably accelerated. The disappearance of ferric ions can be measured by the time taken for potassium thiocyanate, added to the solution, to decolorize. The tests are carried out in wide test tubes placed in a water-bath at 77° F. By repeating the determinations six to ten times, the experimental error is reduced to below 5 per cent. To wash off the copper deposit from the leaves hydrochloric acid (1 in 24) is used.

NEWTON (W.). **Transmission of Tobacco mosaic by Citrus mealybug.**—*F.A.O. Pl. Prot. Bull.*, 2, 3, p. 40, 1953.

Experiments carried out in Ceylon confirmed the report that the citrus mealy bug, *Planococcus citri*, was able to transmit tobacco mosaic virus [*R.A.M.*, 5, p. 257], in this case from infected to healthy tobacco seedlings and *Nicotiana glutinosa*.

DA SILVA (D. M.). **Estudo comparativo das variações da viscosidade citoplasmática entre células sãs e doentes com virus do mosaico do Tabaco (Fumo).** [Comparative studies of the variations in cytoplasmatic viscosity between cells of

healthy and mosaic virus-diseased Tobacco (smoking).]—*Rev. Agric., Piracicaba*, 28, 9–12, pp. 291–304, 2 graphs, 1953. [English summary.]

In a comparative study at Piracicaba, São Paulo, Brazil, the viscosity (measured by Brownian movement) of the protoplasm [cf. *R.A.M.*, 33, p. 74] of tobacco leaf cells infected by tobacco mosaic virus was found to be higher than that of healthy material.

Szirmai (J.). **On a variant of the root virus of seedlings.**—*Mag. Tud. Akad. Agrar. Oszt. Közl.*, 1, 2, pp. 250–270, 1952. [Abs. in *Hung. agric. Rev.*, 2, 2, p. 11, 1953.]

Much of this information on the occurrence of tobacco necrosis virus in combination with *Thielaviopsis basicola* in glasshouse and seedling tobacco plants in Hungary has already been noticed from another source [*R.A.M.*, 18, p. 555]. In 1950 the combination was recorded for the first time in seedling beds in nursery gardens on tobacco and species of *Capsicum*, *Datura*, *Pelargonium*, and *Primula*. Complete control of the virus is obtained by sterilizing the soil with formalin.

Strong (M. C.). **Fungicides for the control of damping-off in Tomatoes.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 36, 3, pp. 285–290, 2 figs., 1954.

In experiments at the Department of Botany and Plant Pathology, Michigan State College, on the control of damping-off of tomato seedlings [*R.A.M.*, 29, pp. 439, 605; cf. 33, p. 188] all the fungicides tested, except manzate, were effective both as soil treatments and dusts. Dusting the seeds until they were well coated with cuprocide, 50 per cent. arasan, 50 per cent. thiram, crag 658, captan, or crag 5400 gave 80 per cent. or more average stand counts, as against 48 per cent. for the untreated. Soil mixed five days before sowing with 1·6 gm. per sq. ft. of captan, manzate, crag 5400, thiram, tersan, or Mathieson 275 gave average stands of 65 to 86 per cent. However, dusting is recommended in preference to soil treatment because it is easier, requires less fungicide, and the abundant hairs on tomato seeds retain the fungicide well. At the same time good cultural practices, which reduce damping-off, should be observed. Sprinkle treatments at five-day intervals after sowing proved unreliable.

Research work and workers.—*Seed World*, 74, 7, p. 40, 1954.

A new tomato variety, Indark (46–4), from Pan America × Rutgers, developed at the University of Arkansas, is resistant to wilt [*Fusarium bulbigenum* var. *lycopersici*: *R.A.M.*, 33, p. 16]. From the Florida Gulf Coast Station an early maturing tomato, Manalee, is released, which is also resistant to wilt and to *Cladosporium fulvum* [loc. cit.], *Alternaria solani* [33, p. 55], and *Stemphylium solani* [31, p. 542].

Davis (D.). **The use of intergeneric grafts to demonstrate toxins in the Fusarium wilt disease of Tomato.**—*Amer. J. Bot.*, 41, 5, pp. 395–398, 4 figs., 1954.

In experiments at the Connecticut Agricultural Experiment Station potted four- to six-week-old Bonny Best tomato plants were grafted with scions of potato, tobacco, *Solanum nigrum*, chilli pepper, *Physalis alkekengi*, and tomato. Three to five weeks later they were inoculated by root dip with *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [*R.A.M.*, 33, p. 453], which is selectively pathogenic to tomato. Wilting and vascular discoloration appeared in the scions, in some even before symptoms were noticeable in the stock. The pathogen was isolated from the stocks but from none of the scions except tomato, showing that a wilt toxin is translocated in advance of the fungus.

Charlton (K[athleen] M.). **The sporulation of Alternaria solani in culture.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 349–355, 1 pl., 1953.

At the Hawthorndale Laboratories, Jealott's Hill, Berks., strain CBPG 7 (Commonwealth Bureau of Plant Breeding and Genetics) of *Alternaria solani*, isolated from a green tomato fruit, was induced to sporulate by the use of ultra-violet light [cf. *R.A.M.*, 24, p. 115 and above, p. 562] as follows. Plates of modified Czapek-Dox agar plus sucrose and marmite were inoculated at the centre and incubated in darkness for ten days at about 24° C. When the colonies were 6 to 8 cm. in diameter the fluffy aerial mycelium was flattened, any tough skin or surface moisture removed, and four plates at a time were irradiated for 20 minutes at a distance of 45 cm. from an Hanovia fluorescent type X_1 ultra-violet lamp without the Wood's glass filter, plates and lamp being enclosed in a red 'Perspex' cabinet, from which ozone was removed by passing the air through sodium nitrite solution. The cultures were then incubated for 18 to 24 hours at about 24°. The spores usually formed first at the edge of the colonies, developing over the whole surface after two or more irradiations. They were removed by flooding with distilled water. Further batches were produced by drying the cultures, storing for a week at 5°, and irradiating as before.

Oxidizing agents, notably hydrogen peroxide and ozone, also induced sporulation but to a lesser degree than ultra-violet light.

Cesaroni (F.). **Indagine preliminare sulle principali malattie crittogamiche del Pomodoro in Provincia di Parma.** [A preliminary investigation of the principal cryptogamic diseases of Tomato in the Province of Parma.]—*Notiz. Malatt. Piante*, 24–25 (N.S. 3–4, *1954*), pp. 97–99, 1954.

In this communication to the second convention of the Società italiana di Fitoatria, held at Parma, in September, 1953, the author states that tomatoes grown in the province of Parma, Italy, are attacked every year by a complex of fungal diseases which appreciably reduces yields [see above, p. 522]. *Alternaria solani* [*R.A.M.*, 32, pp. 347, 518], *Cladosporium fulvum* [18, p. 280], and *Septoria solani* [*S.* ? *lycopersici*: C.M.I. map No. 108] are responsible, the first two fungi being more prevalent than the third.

The control measures recommended consist in seed disinfection with fernasan, and plant spraying with two applications of perenox (4 kg. per ha. in 600 l. water) at a fortnight's interval as soon as the weather favours infection or at 20 days' interval if 200 gm. per hl. of specific adhesive are added, and applications of tulisan (2·4 kg. per ha. in 600 l.) a fortnight after the second perenox treatment and at intervals of 12 days until the weather conditions improve.

Govi (G.). **Due malattie parassitarie dei frutti di Pomodoro.** [Two parasitic diseases of Tomato fruits.]—*Ric. sci.*, 23, 6, pp. 998–999, 1 fig., 1953. [French, English, and German summaries.]

Late-maturing tomato crops in Emilia, Italy, were severely damaged in 1952 by anthracnose (*Colletotrichum phomoides*) and black rot (*Phoma destructiva*). The first record of *C. phomoides* in the country dates from 1878 (Saccardo as *Gloeosporium phomoides*), while the latter appears to have been observed only once before the present report, by Petri in 1934.

Valjda (Z.). **Uzroci epidemijskog ugibanja Brijestova.** [Causes of epidemic dying of Elms.]—*Ann. Exp. for., Zagreb, 1952*, 10, pp. 105–197, 7 pl., 2 diags., 2 graphs, 1952. [French summary.]

In this detailed account of Dutch elm disease (*Ceratostomella ulmi*) in Yugoslavia [*R.A.M.*, 29, p. 389], its history, cause, and development are discussed in relation

to the occurrence of unfavourable, local, climatic conditions (frequent warm, dry periods in the spring and summer) which are considered to be the primary factor in the recent establishment of the disease in epidemic proportions. Since no effective means of control has been found the author recommends the immediate replacement of diseased elms by resistant varieties or by other trees best adapted to local ecological conditions.

Fassi (B.). **Studi e ricerche sulla Pioppicoltura. Ricerche sul marciume radicale del Pioppo in Piemonte.** [Studies and researches on Poplar-growing. Investigations of root rot of Poplars in Piedmont.]—*Pubbl. naz. Cellulosa e Carta*, N.S., *1953*, pp. 43–96, 1 pl., 10 figs., 1953. [Received June, 1954.]

Studies on poplar decline were conducted at Casale Monferrato, Valmacca, and Villafranca, in Piedmont, Italy, following its discovery in these areas during the summer of 1947. The foliage turned yellow, particularly in dry weather, and in severe cases signs that root rot was present were evident at least 50 cm. above soil level. *Rosellinia necatrix* [cf. *R.A.M.*, 13, p. 605] was isolated from outside the bark, *Armillaria mellea* [33, p. 509] from beneath it, and *Pholiota aegerita* [cf. loc. cit.; 33, p. 389] from the wood and particularly the medulla. *Vialina radicicola* was limited in its parasitism to grafts and to fissures in the bark of young trees. The primary factors prerequisite of root rot were lack of healing ability in the clone grafts and poor root development, aggravated by genetic and environmental conditions; *Populus carolinensis* in particular was susceptible. All stands examined were on highly permeable, sandy soils, which were detrimental to normal vegetation but favoured the development of the aerobic organisms by their high oxygen retention.

It is concluded that the best means of preventing root rot is to grow clones having good root development in these soils, for example, hybrids between *P. nigra* and American forms derived from *P. carolinensis* and *P. virginiana*. Prevention in the nursery may be achieved by avoiding root wounds during transplanting.

Schmidle (A.). **Zur Kenntnis der Biologie und der Pathogenität von Dothichiza populea Sacc. et Briand, dem Erreger eines Rindenbrandes der Pappel.** [Contribution to the knowledge of the biology and pathogenicity of *Dothichiza populea* Sacc. & Briand, the agent of a bark blight of Poplar.]—*Phytopath. Z.*, 21, 2, pp. 189–209, 8 figs., 1 graph, 1953.

A description of the symptoms of the poplar bark blight caused by *Dothichiza populea* in Germany [*R.A.M.*, 16, p. 572; 33, p. 509] is followed by a tabulated account of outdoor inoculation experiments with the fungus on one- to five-year-old trees at the Institute for Forest Mycology, Hann.-Münden, during 1952–3.

The maximum incidence of infection resulting from spore inoculations on well-established trees from April to July was 10 per cent. compared with 38·5, 37, 27, and 20 in October, September, February, and March, respectively. Mycelial inoculations were generally more successful, culminating in a maximum of 64 per cent. infections in October. On freshly transplanted trees spore inoculations gave uniformly negative results, whereas 80 per cent. of the mycelial tests were positive. Little damage was inflicted on one-year-old pollarded trees or on artificially weakened branches by spore inoculations during the growing season, though severe natural infection by *Cytospora chrysosperma* [*Valsa sordida*] occurred on this material [loc. cit.]. A comparison of these results with Van Vloten's in Holland [17, p. 569] revealed far-reaching agreement.

It is evident from the foregoing observations that, except under special conditions, the critical period for infection by *D. populea* extends only from September to March. Since inoculation of well-grown trees causes such limited damage, the

losses (heavy in part) from the disease must be attributable to other factors, e.g., weakening of the host through transplanting [see preceding abstract], drought, unsuitable planting sites, waterlogging, and frost. Besides mechanical injuries to the bark, the leaf scars are important as channels of ingress for the pathogen. In varietal reaction tests *Populus deltoides* and *P. robusta* were the most susceptible, with 89 and 37 per cent. infection, respectively, compared with only 5 per cent. for *P. canescens*.

Bazzigher (G.). **Beitrag zur Kenntnis der Endothia parasitica (Murr.) And., dem Erreger des Kastaniensterbens.** [Contribution to the knowledge of *Endothia parasitica* (Murr.) And., the agent of Chestnut blight.] –*Phytopath. Z.*, 21, 2, pp. 107–132, 9 figs., 1 diag., 16 graphs, 1953.

In the spring of 1952 *Endothia parasitica* was observed in the canton of Ticino, Switzerland [*R.A.M.*, 32, p. 222], on oaks (*Quercus pubescens* and *Q. petraea*) [30, p. 550]. In inoculation experiments at the Federal Technical Institute, Zürich, cankers developed on beech twigs in three months; the fungus was reisolated and proved to be pathogenic to chestnuts. On chestnut there was no apparent connexion between the age of a branch and the size of the lesion, but the age of the inoculum was decisive for the establishment of infection, the virulence of 50-day-old cultures being significantly less than that of 20-day-old material. Injuries extending to the cambium and inner cortex were much more favourable to the development of the pathogen than those involving the outer cortex or the wood. The period of budding and immediately thereafter appeared to be the most conducive to infection and the late autumn and winter the least so, while the proliferation of the fungus under the bark reaches a maximum during the hottest months of the year (mid-June to mid-August).

E. parasitica secretes a toxin, designated diaporthin, extractable from culture filtrates with activated carbon or various solvents. It withstood 15 minutes' boiling in a water-bath and induced wilting of tomato and chestnut plants.

Sproston (T.) & Scott (W. W.). **Valsa leucostomoides, the cause of decay and discoloration in tapped Sugar Maples.**—*Phytopathology*, 44, 1, pp. 12–13, 1 fig., 1954.

Valsa leucostomoides was shown by a study of 108 samples from 17 sugar maples (*Acer saccharum*) in March, 1948, to be the principal agent of the decay and discoloration associated with tapping in Vermont, where the population of the tree is decreasing annually. The affected areas appear in longitudinal section as truncated cones, with pale yellow centres bordered by deep olive or greenish-black streaks. The hard, dry rot frequently extends towards the centre of the tree in finger-like projections where several areas coalesce; sometimes the entire sapwood is stained. The fungus was pathogenic in inoculation experiments under laboratory conditions [cf. *R.A.M.*, 10, p. 418] to *A. rubrum*, *A. spicatum*, *A. pennsylvanicum*, beech (*Fagus grandifolia*), birch (*Betula alba*), ash (*Fraxinus americana*), *Prunus virginiana*, and *Ostrya virginiana*, each of the two last-named, however, being susceptible to only one out of 11 isolates. Suggested control is by spray-painting the tap holes at the time of pulling the spiles, and tapping on the diagonal or up and down the butts.

Bakshi (B. K.) & Singh (S.). **Wilt disease of Shisham (Dalbergia sissoo Roxb.). I. Introduction and host-parasitic relationship.**—*Indian For.*, 80, 6, pp. 316–322, 4 pl., 1954.

Fusarium solani was found to be responsible for the wilting of 15- to 25-year-old shisham (*Dalbergia sissoo*) trees [*R.A.M.*, 24, p. 213] in natural stands and artificial

plantations in the Dehra Dun and Saharanpur districts of Uttar Pradesh. The disease, which attacks the entire tree, including the roots, is characterized by yellowing and drooping of leaves and branches, shedding of the rootlets, and absence of nodules. The roots acquire a pinkish-brown stain, which in the late stages may extend up to 10 ft. above the ground in the stem. The whole tree becomes thin and death follows four to six months after the crown shows symptoms. Wilt first appears during April and May but is also common between June and September (during and soon after the rains). The pathogenicity of the fungus was demonstrated in laboratory experiments where healthy pieces of root inoculated with *F. solani* developed the characteristic pink stain observed in the sapwood of wilted trees. Similarly, healthy cut pieces of shisham root were readily infected by *F. solani* when placed in naturally infected soil; the fungus was re-isolated.

Day (W. R.). **Drought crack of Conifers.**—*For. Rec.* 26, 40 pp., 9 figs., 2 diags., 1954.

Abnormal drought with a long, dry, hot period throughout August, 1947, was found to be responsible for the cracking of conifers, spruces in particular, in various parts of Britain, especially in Central Wales and eastern Aberdeenshire. A distinct relation was established between the occurrence of drought crack and the soil capacity for water supply. The heartwood of weakened trees and more particularly of trees with open cracks became infected by fungi through the sapwood, though the latter was attacked only near open cracks where the bark had died. Tests made on four Sitka spruce plots in Radnor Forest indicated that infection of the heartwood was common in uncracked trees standing among cracked ones and that the infection was proportionally much higher in trees originating farthest south. Among the fungi isolated from Norway spruce and Sitka spruce with main stem (*a*) cracked were: *Mortierella pusilla* var. *isabellina*, *Fomes annosus* [*R.A.M.*, 31, p. 262], *Peniophora gigantea*, *Pezicula livida*, *Ophiostoma* [*Ceratocystis*] *piceae* [33, p. 269], and *Fusarium culmorum*; (*b*) uninjured: *Stereum sanguinolentum* [cf. 30, p. 205], *Pezicula livida*, *Ophiostoma piceae*, *Xylaria hypoxylon*, *Dendrophoma* sp., *Phoma* sp., *Pestalotia monochaetioides*, *Cladosporium herbarum*, *Scopularia tenuissimum*, *Stemphylium ilicis*, *Torula ligniperda*, *Trichosporium heteromorphum*, and *Dendrochium hymenuloides*; and (*c*) injured by frost: *Oedocephalum* sp. and *Septocylindrium acutum*. *Nectria* sp. was associated with all three groups on spruce and was also found on cracked Japanese larch.

Boyce (J. S.). **Introduction of exotic trees. Dangers from diseases and insect pests.**—*Unasylva*, 8, 1, pp. 8–14, 1954.

The chief difficulties encountered in the introduction of exotic trees, mainly conifers, are summarized with examples from Europe and the United States. The hazards from parasites are that those of minor significance on native species may become severe on introduced exotics, or a parasite may be introduced which will be pathogenic to native trees. For instance, the introduction of eastern white pine (*Pinus strobus*) from the United States into Europe was not successful because blister rust, *Cronartium ribicola* [*R.A.M.*, 32, p. 524], attacked the trees severely where the alternate hosts (*Ribes* spp.) were widespread, but there are some flourishing stands where these are not present. *Abies grandis*, planted near Lausanne, Switzerland, in 1894 has been dying steadily since 1945 because of *Armillaria mellea*. In Sweden a flourishing plantation of 12-year-old jack pine (*Pinus banksiana*) was ruined by *Dasyscypha* sp., locally only saprophytic.

The artificial spread of pathogens in living plants, cuttings, soil, and by other agencies are briefly reviewed, as also are the pathogens attacking poplars and other trees. It is concluded that the chances of success in introducing exotics are much

smaller than those of failure, and that they should be introduced only if they fulfil some definite need not met by indigenous species.

HENDERSON (F. Y.). **Report of the Director of Forest Products Research for the year 1952.**—*Rep. For. Prod. Res. Bd, Lond., 1952*, pp. 29–34, 8 pl., 1953.

In the mycology section of this report [cf. *R.A.M.*, 33, p. 60] it is stated that active cultures may still be obtained from samples of air-dry wood infected with *Lenzites sepiaria* and *L. trabea* after eight years in a dry atmosphere [30, p. 353].

Preliminary experiments have demonstrated that stimulation of the growth of wood-rotting fungi by wood samples introduced into the culture vessel may be exerted even when the wood is not in actual contact with the mycelium [cf. 31, p. 93].

Preliminary experiments indicate that the rate of attack of beech by *Chaetomium globosum* [32, p. 160; 33, p. 61] is proportional to the amount of mineral nutrients available to the fungus.

Agar and wood block tests demonstrated that when sodium fluoride is thoroughly mixed with soluble calcium salts it becomes inactivated as a wood preservative [32, p. 527]. Therefore it would be as well to avoid using pure sodium fluoride as a preservative for timber such as laths which are likely to come in contact with fresh lime plaster.

Fungal staining and, to a lesser extent, decay of light hardwoods imported from the tropics continue to be a problem. Preservative treatment of the shipped logs has been suggested and a cargo of ramin (*Gonostylus* sp.) thus treated was in excellent condition on unloading.

The conclusion that the heavy rubber or plastic covering of conveyor belting provides considerable protection against fungus attack confirmed field observations by the National Coal Board.

The components of the zinc oxychloride paints and plasters recommended for the eradication of dry rot (*Merulius lacrymans*) [33, p. 62] from infected masonry are not yet available for commercial use. However, preliminary tests in co-operation with the Building Research Station have demonstrated that ordinary cement renderings may be made toxic to fungi by the addition of copper aceto-arsenite, but no further work with this material is contemplated owing to the risk to health.

For the first time in England decay caused by basidiomycetes in the filling timbers of water-cooling towers was discovered at Kettering power station. Serious rot of the structural timbers was also noticed. The former decay is believed to be due to drier conditions arising from the infrequent use of these towers during the past few years. Laboratory tests were carried out to ascertain the suitability of selecting hardwoods by exposing them to attack by *C. globosum* both untreated and after leaching with warm water for up to eight weeks. Opepe (*Sarcocephalus diderrichii*), greenheart (*Ocotea rodiaei*), and wallaba (*Eperua falcata*) were not attacked, but the last-named exuded a sticky gum on leaching and is therefore unsuitable for use in cooling towers. Both leached and unleached tallow-wood (*Eucalyptus microcorys*) suffered only slight loss in weight owing to fungus attack. Nyankom (*Tarrietia utilis*) and beech showed marked decay. Resin-bonded gaboon (*Aucoumea klaineana*) plywood, in which the veneers themselves were impregnated with a synthetic resin, showed only low weight losses and slight visible evidence of *Chaetomium* attack after similar treatment. Ordinary gaboon plywood bonded with the same adhesive was severely attacked.

The marked state of decay of pleasure craft as compared with fishing boats appears to be due to the fact that the former are used only at infrequent intervals and indicates that they require more durable timbers or the application of modern methods of preservation [33, p. 392].

Cox (H. A.). **Progress since 1900 in the preservation of wood.**—*Timb. Technol.* (formerly *Timb. News*), 61, 2167, pp. 217–219, 1953.

This useful survey of progress in wood preservation in Great Britain [*R.A.M.*, 33, p. 328] during the present century comprises the essential information on the various processes employed, including incising, water- and oil-borne preservatives and their application, plant, and mycological and entomological research.

Jacquiot (C.). **Les échauffures des bois abattus.** [Staining in felled timber.]—*Étud. tech. Inst. nat. Bois, Paris*, 11, 6 pp., 1952. [Mimeographed. Received July, 1954.]

Brief, practical directions are given for the chemical treatment of felled, unbarked timber against fungal staining [*R.A.M.*, 33, p. 458], including that caused in conifers by *Stereum sanguinolentum* [cf. above, pp. 539, 570], in beech by *S. purpureum* [32, p. 51], and in ash by an as yet unidentified fungus belonging to the Xylariaceae. A list is given of commercial preparations (creosote and similar products, pentachlorophenol, and gammexane [loc. cit.]) suitable for the purpose, with the addresses of the French manufacturers.

Kuntze (F. H.). **Über den Antagonismus zwischen Armillaria mellea und Pleurotus ostreatus in vitro.** [On the antagonism between *Armillaria mellea* and *Pleurotus ostreatus in vitro*.]—*Wiss. Z. Univ. Jena*, 2, 3, pp. 97–99, 1952–3. [Abs. in *Z.PflKrankh.*, 61, 4, p. 216, 1954.]

In Germany *Armillaria mellea* readily passes from dead tree stumps to living wood, causing appreciable damage. When it was cultured with *Pleutotus ostreatus* [*R.A.M.*, 33, p. 127] on agar plates, in liquid media, and in flasks filled with beech and spruce sawdust, *P. ostreatus* rapidly and completely overgrew *A. mellea*, the incipient rhizomorphs of which failed to develop [cf. 32, p. 332].

Bavendamm (W.). **Mikroskopisches Erkennen und Bestimmen von holzebewohnenden und holzzersetzenden Pilzen.** [Microscopic recognition and determination of lignicolous and wood-decomposing fungi.]—*Handb. Mikroskop. Tech.*, 5, 2, pp. 817–844, 17 figs., 1951. [Received July, 1954.]

Methods for the identification of lignicolous fungi by microscopy [cf. *R.A.M.*, 4, p. 385; 16, p. 574; 18, p. 774; 28, p. 201] are summarized from 23 contributions to the literature.

Blumer (S.). **Über die Eignung von Penicillium expansum für eine biologische Bekämpfung von Schwarzfußpilzen (Rhizoctonia solani Kühn).** [On the suitability of *Penicillium expansum* for a biological control of black leg fungi (*Rhizoctonia solani* Kühn).]—*Phytopath. Z.*, 21, 2, pp. 163–188, 3 figs., 3 graphs, 1953. [English summary.]

In numerous trials covering the period from 1948 to 1951 at the Wädenswil Experiment Station, Zürich, Switzerland, the biological control of damping-off of vegetables, caused by *Rhizoctonia* [*Corticium*] *solani* and *Moniliopsis aderholdi* [*R.A.M.*, 28, p. 499] in a garden compost soil, by means of the antagonists *Penicillium expansum* and *Trichoderma viride* proved impracticable.

Culture filtrates of *C. solani* caused no reduction of seed germination but arrested the growth of Savoy cabbage, cauliflower, pea, and tomato roots; the crucifer strains [33, p. 110] used in the tests do not normally attack tomato. On the other hand, culture filtrates of *P. expansum*, especially those 11 to 13 days old, materially lessened seed germination, growth of *C. solani*, and conidial germination of *Alternaria tenuis*. Patulin [32, p. 140] acted in the same way as filtrates of *P. expansum*

in comparable experiments, and is assumed, therefore, to be the effective principle of the metabolic products.

It is concluded that post-emergence damping-off is a non-specific symptom which may be induced by fungal infection, contact with filtrates of *C. solani* and *P. expansum*, patulin, or various other substances, e.g., pectasin A (an enzyme preparation), following mechanical injuries or preliminary treatment with alcohol or ether.

COLHOUN (J.). **Observations on the incidence of club-root disease of Brassicae in limed soils in relation to temperature.**—*Ann. appl. Biol.*, 40, 4, pp. 639–644, 3 graphs, 1953.

In further studies at The Queen's University of Belfast Enfield Market cabbage plants growing in heavily limed soil experimentally inoculated with *Plasmodiophora brassicae* [*R.A.M.*, 33, p. 192] developed only slight infection when kept in a greenhouse at a mean temperature of about 23° C. for periods of up to 12 days and then removed for periods up to 21 days to an open-air shaded verandah with a north aspect (mean temperature not above 12·5°). When, however, the plants were kept in the greenhouse for at least six days and then placed on the verandah (16°) severe infection ensued. A very severe attack occurred when the plants remained in the greenhouse, but when they were kept at verandah temperatures they all remained healthy.

It is concluded that when cabbages are grown in the open air in summer in full sunlight, it is probable that suitable temperatures will persist for long enough to permit attacks of club root in limed soil with a heavy spore load.

STANGE (LUISE). **Zur Frage nach den Störungen des Stoffwechsels in den Blättern vergilbungskranker Zuckerrüben.** [On the question of disturbances of the metabolism in the leaves of yellows-diseased Sugar Beets.]—*Phytopath. Z.*, 21, 2, pp. 214–217, 1953.

In September and October, 1951, and in August and September, 1952, different parts of Kleinwanzleben E sugar beet leaves, picked either at 8 a.m. or at 6 p.m. from healthy plants and those infected by beet yellows virus [*R.A.M.*, 33, p. 460], were analysed for sugar and nitrogen. The sucrose, glucose, and fructose contents of the mature infected leaf blades were uniformly far higher (up to tenfold in the case of fructose) than of the healthy samples, regardless of the date or time of analysis. The differences tended to be slightly less in the basal half without the midrib than in the apical, denoting a parallelism between increased sugar content and external symptom expression. There was a slight rise in the sugar content of young, still symptomless leaves. In the midrib and petiole sections there was no difference between healthy and infected samples in respect of their sugar contents, the level of glucose being about double that of the other two [cf. 31, p. 217].

The nitrogen content of the apical portions (without the midrib) of mature infected leaves was only half that of the healthy samples. In the basal halves the disparity was less marked, while the reduction in the nitrogen level of symptomless leaves was slight.

YARWOOD (C. E.). **Mechanism of acquired immunity to a plant rust.**—*Proc. nat. Acad. Sci., Wash.*, 40, 6, pp. 374–377, 1 fig., 1954.

The existence of acquired immunity in bean (*Phaseolus vulgaris*) plants infected with rust (*Uromyces phaseoli*) [*U. appendiculatus*: cf. *R.A.M.*, 33, p. 4] was demonstrated at the University of California, Berkeley. Established infections of rust caused a reduction in numbers, but not in size, of rust lesions in subsequent infections. The germination of rust uredospores on agar plates was reduced by the presence of enclosed rusted leaves. Similar inhibition effects were observed with

infection of *Antirrhinum majus* leaves by rust (*Puccinia antirrhini*) [cf. loc. cit.]. A detached rust-infected antirrhinum leaf placed with the lower surface pressed against the lower surface of an attached newly inoculated bean leaf always resulted in fewer rust lesions on the attached leaf than if a healthy antirrhinum leaf were used. Rusted leaves did not give any degree of immunity to plants inoculated with other plant pathogens.

It is concluded that this acquired immunity from rusts is due partly to a gas produced by the pathogen which is toxic to the germination of rust spores.

Mitchell (J. W.), Zaumeyer (W. J.), & Preston (W. H.). **Absorption and translocation of streptomycin by Bean plants and its effect on the halo and common blight organisms.**—*Phytopathology*, 44, 1, pp. 25–30, 1 fig., 1 graph, 1954.

In continuation of previous experiments at the Bureau of Plant Industry, Beltsville, Maryland, a streptomycin-dependent strain of *Escherichia coli* was used to identify the translocated antibiotic in the leaves of Pinto bean [*Phaseolus vulgaris*] plants following the application of streptomycin sulphate to their stems for the control of *Pseudomonas* [*medicaginis* f.sp.] *phaseolicola* and *Xanthomonas phaseoli* [*R.A.M.*, 32, p. 659].

Measurements of inhibition zones surrounding filter paper disks impregnated with treated plant sap on Thaxter's agar freshly seeded with *X. phaseoli* showed that up to 67 per cent. of the total streptomycin sulphate was translocated to the primary leaves as free streptomycin during the five days immediately following its application [cf. 33, p. 545]. Measurable amounts were already detectable in the leaves after eight hours and the maximum concentration was reached during the third day. Primary leaves inoculated with *P. m.* f.sp. *phaseolicola* about ten minutes after treatment of the first internodes with streptomycin failed to develop visible halo blight symptoms. At a concentration of 100 μgm. the antibiotic conferred absolute protection, while at 50 the appearance of the lesions was retarded and their subsequent development completely arrested; below this the symptoms were delayed but not arrested.

Immature pods dipped in a 0·1 per cent. aqueous solution of streptomycin sulphate a fortnight before inoculation with *P. m.* f.sp. *phaseolicola* were only partially protected. The severity of halo blight on inoculated leaves was reduced and systemic infection prevented by the immersion of plants with initial symptoms on the primary leaves in 0·05 per cent. streptomycin sulphate solution, but no control was effected by a similar treatment four or six days after infection.

Zaumeyer (W. J.). **Snap bean breeding studies.**—*Seed World*, 74, 7, pp. 36, 47, 1954.

At the Horticultural Crops Research Branch, Beltsville, Maryland, six lines of snap beans [*Phaseolus vulgaris*] resistant to bean mosaic virus [*R.A.M.*, 29, p. 600; 33, p. 517] from the cross Topcrop × Tenderpod are in the final stages of development. The author emphasizes the need for testing new varieties in as many new localities and exposed to as many diseases in the field as possible, prior to general release.

Zaumeyer (W. J.). **Snap Bean breeding studies.**—*Seed World*, 74, 8, pp. 38–40, 2 figs., 1954.

This progress report reviews the work being done by the United States Department of Agriculture on the breeding of beans [*Phaseolus vulgaris*] of the Black Valentine type for resistance to diseases, particularly virus [see preceding abstract] and bacterial, and on the experimental methods of controlling them.

Chamberlain (D. W.) & McAlister (D. F.). **Factors affecting the development of brown stem rot of Soybean.**—*Phytopathology*, 44, 1, pp. 4–6, 2 graphs, 1954.

At Illinois Agricultural Experiment Station brown rot (*Cephalosporium gregatum*)

[*R.A.M.*, 28, p. 204; 32, p. 165] progressed more rapidly in soy-beans beyond the pod-filling stage than in younger ones irrespective of temperature. A high day temperature (32° C.) acted comparably to a high constant temperature in the inhibition of fungus growth. The rate of water flow in Lincoln soy-bean stems was inversely proportional to the degree of browning in the vascular system (*Plant Dis. Reptr*, 35, pp. 318–319, 1951). In severely infected plants the supply of water may be limited to about half the normal, resulting in foliar desiccation during periods of intense transpiration and in premature pod ripening, associated with reduced seed size and yield.

Schmidt (T[rude]). **Achtet auf die Gelbstreifigkeit der Zwiebel!** [Beware of the yellow streaking of the Onion!]—*Pflanzenarzt*, 6, 8, pp. 3–4, 2 figs., 1953.

Sporadic cases of yellow streakiness [? onion yellow dwarf virus: C.M.I. map No. 46] have been observed of recent years in onion crops in Austria, but not until the current season did the extent and severity of the disease begin to cause alarm. Some of the samples submitted to the Vienna Plant Protection Institute came from stands covering several hectares, the infection of which represented heavy financial losses to the growers. The symptomatology, transmission by aphids [*R.A.M.*, 33, p. 401], control by isolation, roguing, and insecticidal treatment are described. The virus is disseminated almost exclusively from seed-bearer stands, which should not be located, therefore, near one-year crops.

Nelson (R.) & Mooar (Marie). **Comparative resistance to leaf blight diseases in some commercial varieties of Celery in 1952 and 1953.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 36, 3, pp. 275–279, 1954.

In studies in the Department of Botany and Plant Pathology, Michigan State College, a comparison was made of the resistance of some commercial celery varieties to early blight (*Cercospora apii*) [*R.A.M.*, 33, p. 72] and late blight (*Septoria apii-graveolentis*) [32, p. 58]. A general susceptibility of most commercial varieties to *C. apii* was observed under conditions favourable to the development of the fungus both in 1952 and 1953. Florida Green Pascal, Emerson Pascal, Earligreen, and Improved California Pascal showed more resistance to both diseases than most of the other green varieties. In 1952 the first three and Utah 10-B were the most resistant to *S. apii-graveolentis*; only Michigan Golden, of the Golden Self-blanching varieties, showed some resistance to late blight and was slightly injured by *C. apii*.

Evans (A. C.). **Rosette disease of Groundnuts.**—*Nature, Lond.*, 173, 4417, pp. 1242–1243, 1954.

Groundnut rosette disease is present in the three areas in Tanganyika [*R.A.M.*, 33, p. 16] farmed by the Overseas Food Corporation. At Kongwa losses are negligible, as there is little seasonal carry-over, probably due to low rainfall, which usually ceases by harvest time so that soil conditions are unfavourable to the germination of seeds left in the ground, the few seedlings that develop usually dying before the next rains commence. At Nachingwea, where losses are serious, and at Urambo, where they are so great that the crop is no longer grown, a high percentage of volunteer plants survives through the dry season carrying the virus and its vector (*Aphis craccivora*).

In recent work at Nachingwea seed dressings with the systemic insecticide schradan gave complete control of aphids for the first three weeks of the life of the plant and reduced the initial incidence [31, p. 315].

In 1951 Mwitunde appeared to show some resistance [33, p. 464] in a variety trial and in 1952 two strains of this variety developed considerably less disease than the

other 23 varieties and also gave the highest yields. When infested experimentally with *A. craccivora*, Mwitunde was infected to the same extent as the other varieties. The aphid reproduced approximately one-third as frequently on Mwitunde as on Natal Common, the lower rate of increase permitting the extermination of a higher percentage of colonies by predators. There was considerable variation in the degree of infectivity of aphids reared on the two varieties, though it was always lower on Mwitunde, ranging from 8 to 71 per cent. for individual plants of Natal Common and 0 to 32 per cent. for Mwitunde. There are indications that the latter variety may have some tolerance of the virus; it also possesses the characteristic of seed dormancy, permitting an effective break in the carry-over of virus and vector. As Mwitunde is a very mixed variety there is a marked possibility of selecting a strain with high yielding ability and increased field resistance to rosette.

Bouriquet (G.). & Jaubert (P.). **Une affection des graines de l'Arachide au Sénégal causée par Sclerotium bataticola Taub.** [A disease of Groundnut seed in Senegal caused by *Sclerotium bataticola* Taub.]—*Agron. trop., Nogent* 9, 2, pp. 197–200, 4 figs., 1954.

In February, 1953, examination at the Centre of Agronomic Research, Bambey, Senegal, of groundnut seeds of population no. 97 imported from Dahomey and grown for the first time in Senegal in 1952 showed that 34 per cent. were infected by *Macrophomina phaseoli* [*R.A.M.*, 27, p. 171], causing the rancid condition known in the United States as 'concealed damage' [loc. cit.].

Kunieda (K.). **Studies on the bacterial wilt of Eggplants. I. Varietal differences of hosts in reaction to the causal bacteria.**—*Ann. phytopath. Soc. Japan*, 17, 3–4, pp. 133–136, 1953. [Japanese, with English summary. Received April, 1954.]

Inoculation experiments in Japan on the eggplant varieties Daisen Maru No. 2, susceptible to bacterial wilt (*Pseudomonas solanacearum*) [C.M.I. map No. 138], and Durable Shinkuro (resistant) demonstrated that bacterial growth on the plant surface of the latter was definitely suppressed and that the bacterial population within the tissues was markedly smaller. Chromatographic separation of the expressed sap of both varieties confirmed that Shinkuro sap contained a fraction with the strongest inhibitory effect on bacterial growth.

Lohwag (K.). **Neue Methoden der Champignonkultur.** [New methods of Mushroom culture.]—Reprinted from *Int. Fachzschr. Brau-, Gärungs -u. Kältetech.*, 6, 3, 5 pp., 3 figs., 1953.

Up-to-date methods of mushroom culture are described on the basis of observations made recently by the author in the United States at the Mushroom Culture Research Laboratory, Beltsville, Maryland, and the Great Western Mushroom Company, Denver, Colorado, and in England at the Mushroom Research Station and Noble Mushrooms, Ltd. Yaxley, Peterborough, and Stewart-Wood Farm, Aylesbury.

Luttrell (E. S.). **Melanconium leaf and stem fleck of Grapes.**—*Phytopathology*, 43, 6, pp. 347–348, 1 fig., 1953.

In Georgia cultivated Warren and wild bunch grapes (*Vitis bourquina*) are affected by bitter rot (*Melanconium fuligineum*) [*R.A.M.*, 28, p. 561; 33, p. 466] but to a lesser extent than Muscadines (*V. rotundifolia*). Mild leaf and stem infection of negligible importance is present on both hosts; isolations from such tissues consistently yielded *M. fuligineum*. Inoculation experiments with conidia from berries reproduced the disease in young developing tissues of *V. rotundifolia*, *V. bourquina*, and *V. labrusca*.

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